CEMBER

Three-Tube Loop Set—Page 1005

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25 CENTS

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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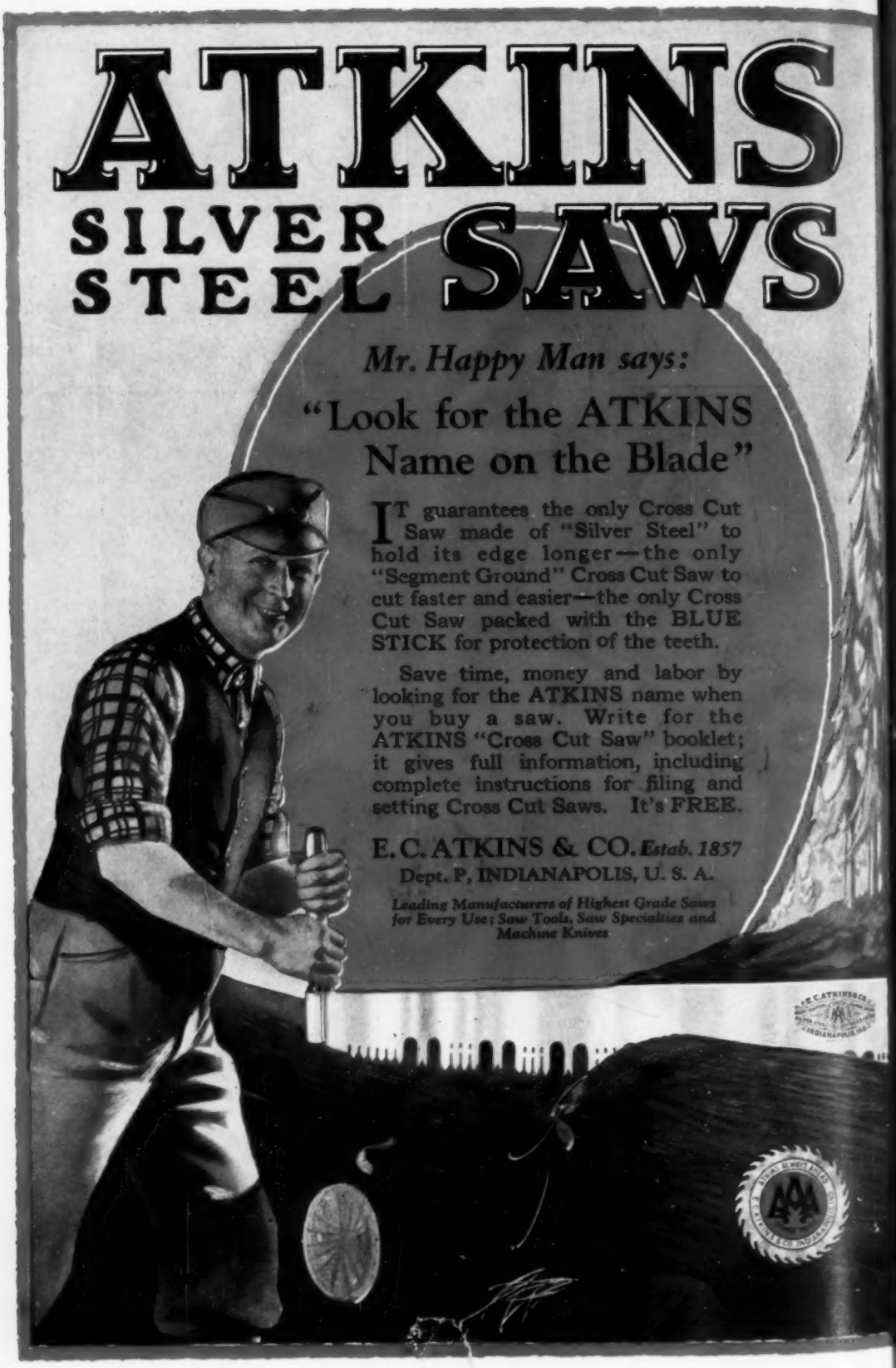
SEE PAGE 963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Fifteen Steamers Caught by Unseasonal Ice Floes in the Baltic Sea Were Saved When the Russian Ice Breaker, Shown in the Right Foreground, Cleared Lanes through Which They Reached Leningrad; Several German Ice Breakers Aided in the Rescue Work—See Page 984

Fifteen Steamers Caught by Unseasonal Ice Floes in the Baltic Sea Were Saved When the Russian Ice Breaker, Shown in the Right Foreground, Cleared Lanes through Which They Reached Leningrad; Several German Ice Breakers Aided in the Rescue Work—See Page 984

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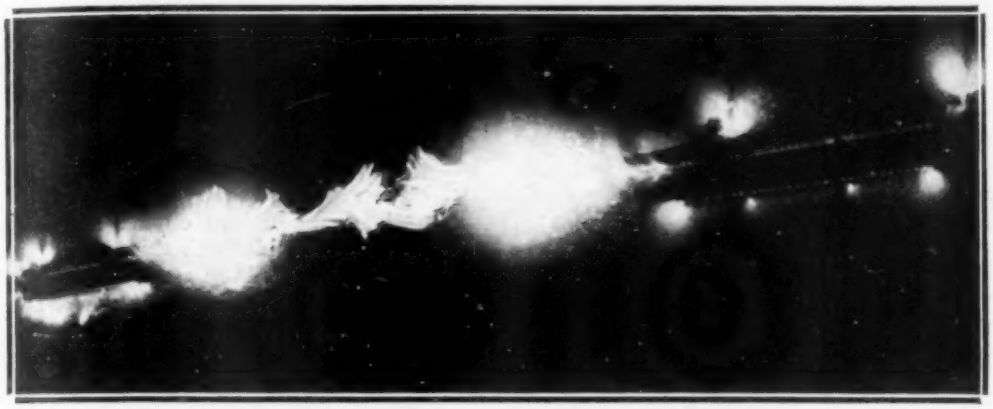
Vol. 46 DECEMBER, 1926 No. 6



Writhing Ribbon of Living Flame, Twenty Feet in Length, Created When More Than Two Million Volts of Electricity Were Released in the Greatest Man-Made Lightning Flash

Man-Made Lightning Leaps Twenty-Foot Gap

Crash of Artificial Thunder Inaugurates Laboratory That Uses over Two Million Volts to Solve Power-Line Troubles

A DAZZLING flash of flame, twenty feet long, marked the opening of a high-voltage laboratory at Stanford University. Two million and a hundred thousand volts were condensed in the initial man-made lightning. The exhibition was the first test of apparatus with which Dr. Harris J. Ryan, in whose honor the laboratory has been named, expects to solve the pressing problems of long-distance, yet economical, transportation of electric power.

The development of the water-power resources of the Pacific coast, which embrace sixty per cent of all the available water power in the United States, has been handicapped by the fact that the falls where power is generated are mainly far back in the mountains, 200 miles or more from the cities where the power is needed. Electricity at moderate voltages cannot be sent over long distances without tremendous losses, due to the resistance of the power lines, while development of high-tension lines has been hindered by the inability of engineers to control the current and prevent its breaking down the insulators used. The highest power handled so far has been 220,000 volts, over a line designed by Dr. Ryan.

In the new laboratory, he plans to study the action of high voltages and design insulators and equipment strong enough to carry the enormous pressures. The initial experiment showed that 2,100,000 volts would leap through twenty feet and one inch of air space, but if no grounded substance is within that distance of the high-tension line then the current cannot escape.

Six giant transformers, each of 350,000 volts' capacity, compose the main equipment of the Ryan laboratory, which is housed in a large building resembling the hangar of a dirigible. Painted a dead black in the interior, and with every crack sealed against light, it can be turned into a cavern of gloom, so that the investiga-

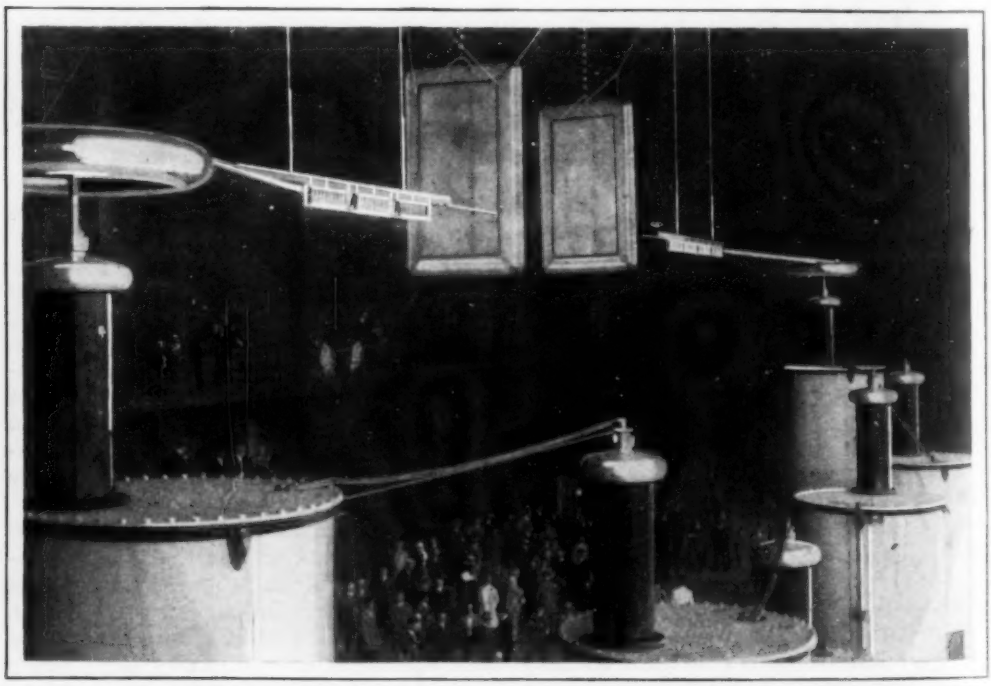
tors may observe the first faint hint of corona light around the insulators and watch it grow until the danger point is reached and the bolt leaps through space.

Outside, the university has set aside right of way for an experimental high-tension line that will be seven miles long when all sections are completed. Here the theories worked out in the laboratory will be put to actual test by sending the output of the six big transformers through special lines supported by insulators designed to meet the requirements shown in the laboratory tests. With twenty feet of clear space needed to keep the electricity from escaping, three doors, forty-seven feet high and forty feet wide, are provided in one side of the building, and when they are rolled back, the connecting wires to the high-tension line will run through the center of the openings.

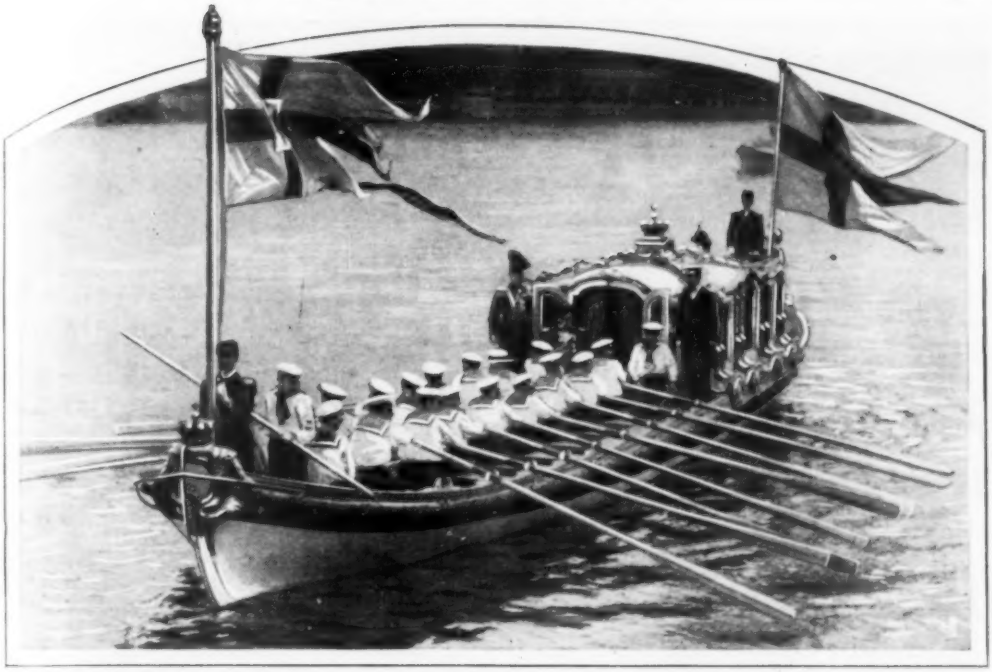
In his opening-day demonstration Dr. Ryan performed two experiments to show the capacity of the laboratory to generate the greatest man-made lightning bolts ever attempted. In the first, two huge electrodes, six by eight feet in size, were suspended more than eighteen feet apart, the massive doors closed, and the switch thrown that awakened the transformers to life. In a moment, a purplish haze began to glow about the corners of the electrodes as Dr. Ryan moved the control switch up to 500,000 volts. As he advanced it farther, darting tongues of flames began to appear. They twisted and writhed like fiery snakes, shooting here and there, feeling their way through the air in search of some path to the ground. The flames grew longer and longer as Dr. Ryan called out "a million volts." Above the huge electrodes, suspending them from the ceiling, mounted tier on tier of enormous insulators.

Up these the flames climbed, until it seemed they would reach the ceiling and escape. At two million volts the boldest tongues were almost to the rafters, and the hissing uproar was almost deafening. Then with a tremendous thunder clap the current jumped the gap in a blinding sheet.

The second experiment was made with brass rods as electrodes, each sharpened to a needle point. The points were placed just over twenty feet apart, and again the bolt leaped the gap.



Tops of the Giant Transformers, and the Huge Plate Electrodes, Suspended Eighteen Feet Apart; Note the Comparative Size of the Spectators on the Balcony and Main Floor



When the King of Sweden Goes Forth to Meet Royal Visitors Arriving by Steamer; Oar-Propelled Cutter and Its Picked Crew, Suggesting Galleys of Ancient Days

OARS PREFERRED TO MOTOR ON ROYAL CRAFT

This is truly the age of motors, but on several occasions when extreme dignity is to be observed, customs of the past are still followed. Horses draw the royal coach of England and, in Sweden, when the king goes forth to meet the visiting heads of foreign nations, he uses an oar-propelled cutter to reach the steamer. The boat has been elaborately redecorated and is fitted with a sheltered cabin impressively guarded by attendants. A picked crew of oarsmen is detailed to row.

PEAT FIBER USED FOR CARPETS AND WOOD SUBSTITUTE

Peat as fuel is widely used in many countries and often proves a reliable source of warmth during coal shortages, but recent experiments with the substance show that its serviceability is not limited to stoves. German investigators have found that its fibers can be dyed, bleached and woven into carpets, drapes and even clothing, while experiments at Hamburg and Dresden indicate that it may prove an excellent substitute for wood. The peat is subjected to great pressure and, at the same time, combined with wax. The resulting material is said to resist water, fire and variations of temperature and costs about three-fourths as much as oak of commercial grades. It is so hard that it can be employed for paving material and for railroad ties. Peat filling for mattresses and cushions is also in demand.

METAL RULE FOR FITTING CORKS SAVES DRUGGIST TIME

To measure the mouths of bottles, a graduated metal rule quickly tells the size of the cork that will fit. Readings are plainly legible on the side of the gauge. The measure is tapered to fit bottles of many different capacities and is specially serviceable in drugstores and laboratories where corks are constantly used.

© Herbert Photos

Demonstrating the "Seaplane" Dive; Cardboard Wings and Foot Supports Permit Graceful Soaring

SWIMMER DOES SEAPLANE DIVE WITH CARDBOARD WINGS

Contestants in a water carnival on the Isle of Jersey introduced a novelty in fancy diving last season by wearing cardboard wings on their arms, and "tail" and "landing-gear" equipment. The swimmers resembled seaplanes as they shot through the air and were able to make longer and more graceful flights with these appendages.

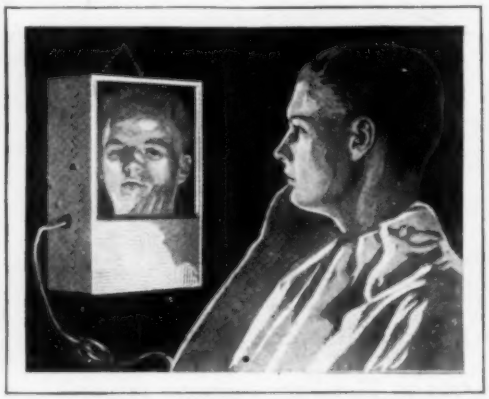
CLOTH FROM PINEAPPLE

A durable fabric that takes dyes well and is said to resist wear almost as stanchly as leather, is being manufactured from the fibers of pineapple leaves in the Philippines, throughout the Indian archipelago and in parts of China. The "pina" cloth, as it is called, is attracting attention in the textile world as it is not difficult to prepare and its qualities commend it to wider usage. The fleshlike tissues are stripped from the leaves and when the fibers have been removed, they are soaked, washed and bleached several times, before going to the weaver.

RED OR WHITE COOLEST COLOR FOR HOT CLIMATES

Red is a satisfactory color for clothing in hot weather as it absorbs less of the sun's rays than other shades. Black is the worst and white ranks close to red. Fabrics that reflect light are preferable to those that absorb it. Artificial silk is an excellent material, although it is said not to exclude the rays that tan the skin. Dark clothing is warmer, hence to be preferred in winter, and undergarments that fit snugly but not too tight help keep the body warm if made of the right materials.

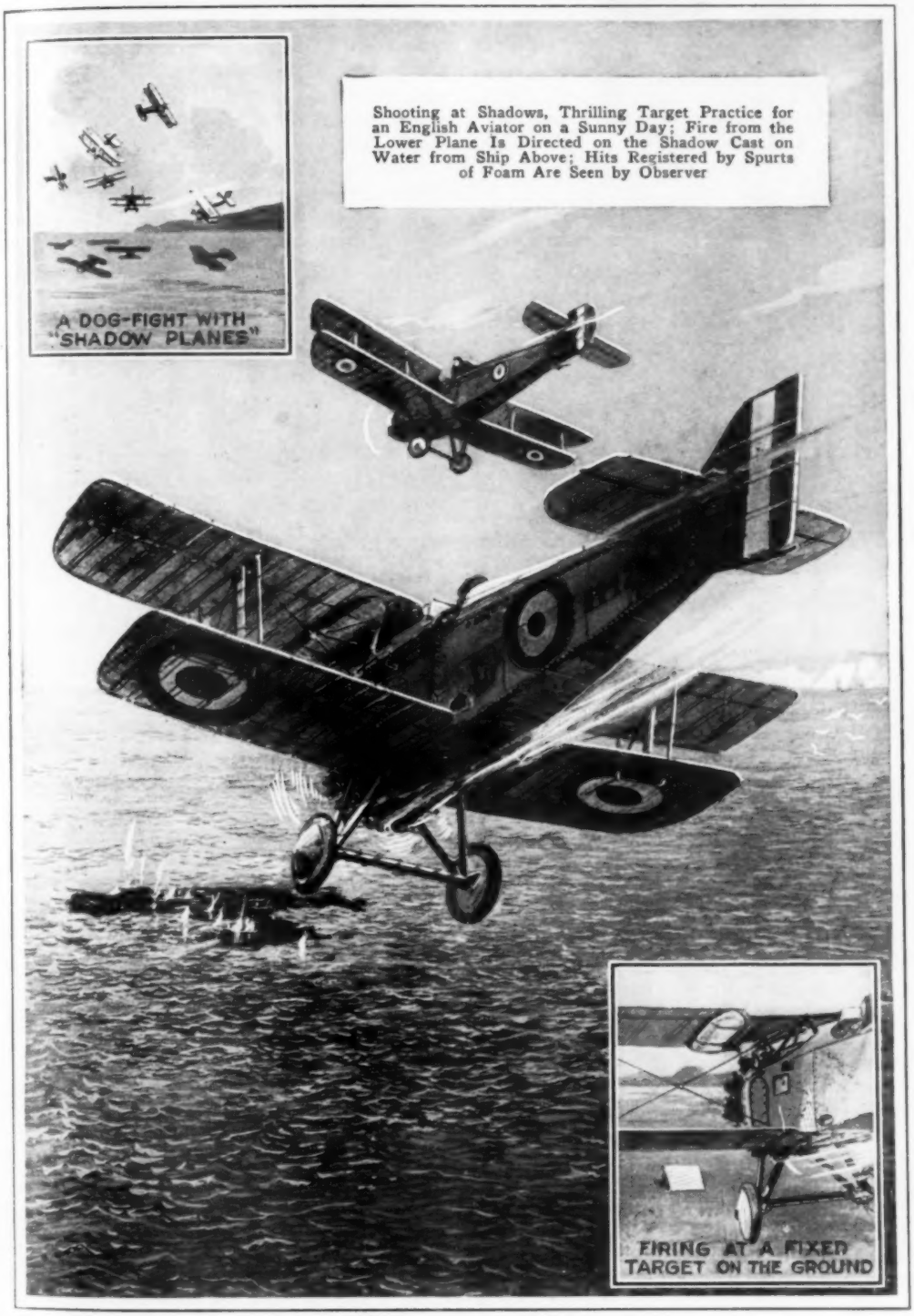
REFLECTED LIGHT FOR SHAVING SHIELDED FROM EYES



Light from Mirror Shines Upward on Face, Keeping the Glare from Eyes

Fashioned as part of a shaving mirror for the wall or chiffonier, an electric light is so adjusted that the illumination is thrown upwardly on the face but cannot strike the eyes directly. This not only protects the vision but lights the face so plainly that thorough work with the razor is easier.

SUN-MADE TARGETS TEST SKILL OF PLANE GUNNERS



Shooting at Shadows, Thrilling Target Practice for an English Aviator on a Sunny Day; Fire from the Lower Plane Is Directed on the Shadow Cast on Water from Ship Above; Hits Registered by Spurts of Foam Are Seen by Observer

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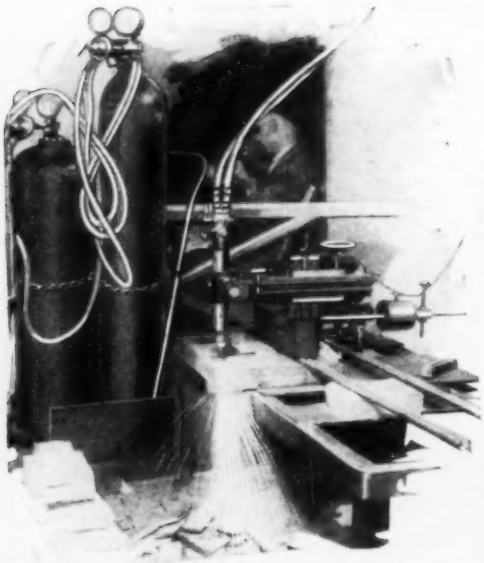


Hot Flame Cutting Thick Steel; Motor-Driven Carriage Propels the Block of Metal

STEEL-CUTTING FLAME IS RUN BY ELECTRIC MOTOR

Propelled by a small electric motor, a steel cutter using an oxyacetylene-torch flame makes successive slices without the need of a workman to guide the instrument. It is said to penetrate steels of great thickness and to reduce hazards.

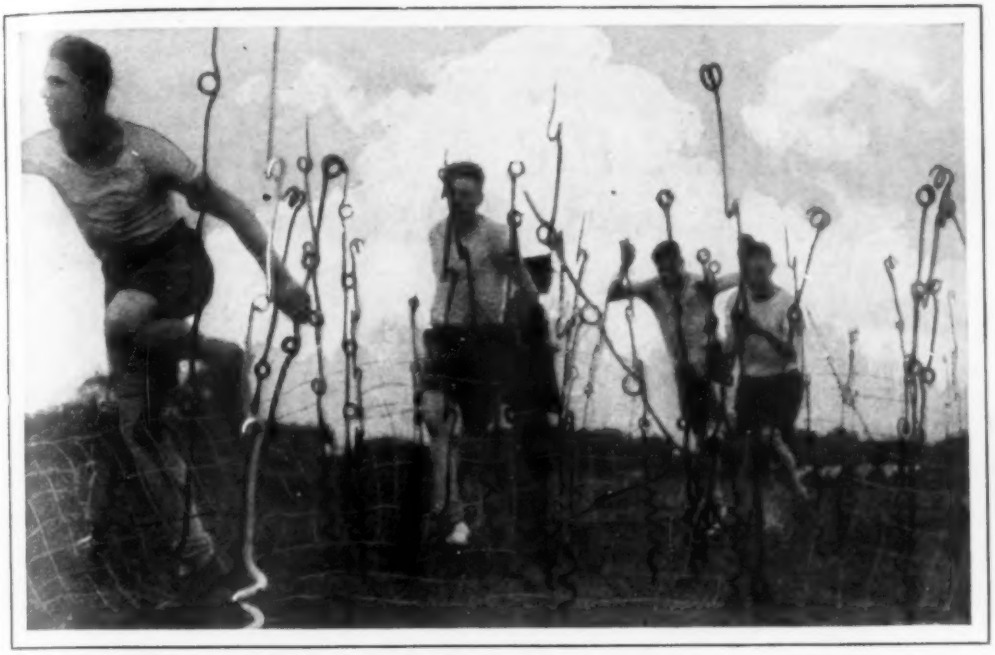
EYE TROUBLES DUE TO POOR LIGHTING

Poor lighting is largely responsible for the fact that seventy per cent of the eyes of adults have one or more defects, according to Matthew Luckiesh, an authority on illumination. Nearsightedness, eye strain and nervous disorders are among the ill effects of inadequately lighted homes, offices and factories, he points out, and declares that, in addition to insufficient artificial light and restricted sunshine, too heavy demands placed upon the vision by excessive reading, writing and other tasks, are the cause of eye afflictions in many persons. He asserts that twenty-three per cent of the electric filament lamps in use have no shades, fifty per cent of shades employed do not properly shield the eyes or diffuse the light, and that many of the ceiling fixtures are obsolete, while many sockets should contain lamps of higher wattage. He recommends that the number of service outlets from the lighting circuits should be trebled and the total wattage in the average American home at least doubled.

FLINTLOCK FIRED AT GUN MEET IN HONOR OF DANIEL BOONE

One of the features of the interstate rifle and pistol matches at Sea Girt, N. J., is target practice with weapons of former days at a range of fifty yards. This event is known as the Daniel Boone match and gives modern marksmen a chance to demonstrate their skill, and hardihood as well, for some of the pieces have a terrific kick. An old flintlock gun such as was used by the pioneers was fired by David McDougal, fifteen-year-old son of Lieut. Col. Douglas C. McDougal of the Marine corps. He was the youngest entrant in this match.

Maj. Gen. John A. Lejeune, at Left, and Lieut. Col. McDougal Watch Young McDougal Fire Old Flintlock



Suggesting the Perils of Going through "No Man's Land" in Wartime; Runners Breaking Past a Network of Wire Barriers in Quebec Obstacle Race

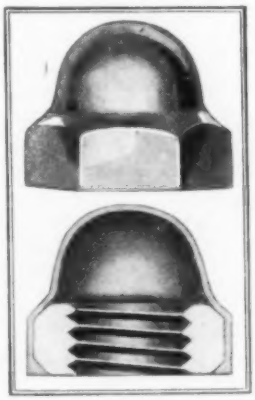
RACE THROUGH WIRE BARRIERS TAXES RUNNERS' SKILL

Tangles of wire netting and upright barriers of metal were placed on a race course in Quebec to test the runners' ability to pass through obstacles. The obstructions were woven in such a way that they did not injure the participants. Watchers were on hand to see that the runners did not attempt to evade them by departing from the course.

RADIO TEST OF AUTO FINISH REVEALS FLAWS

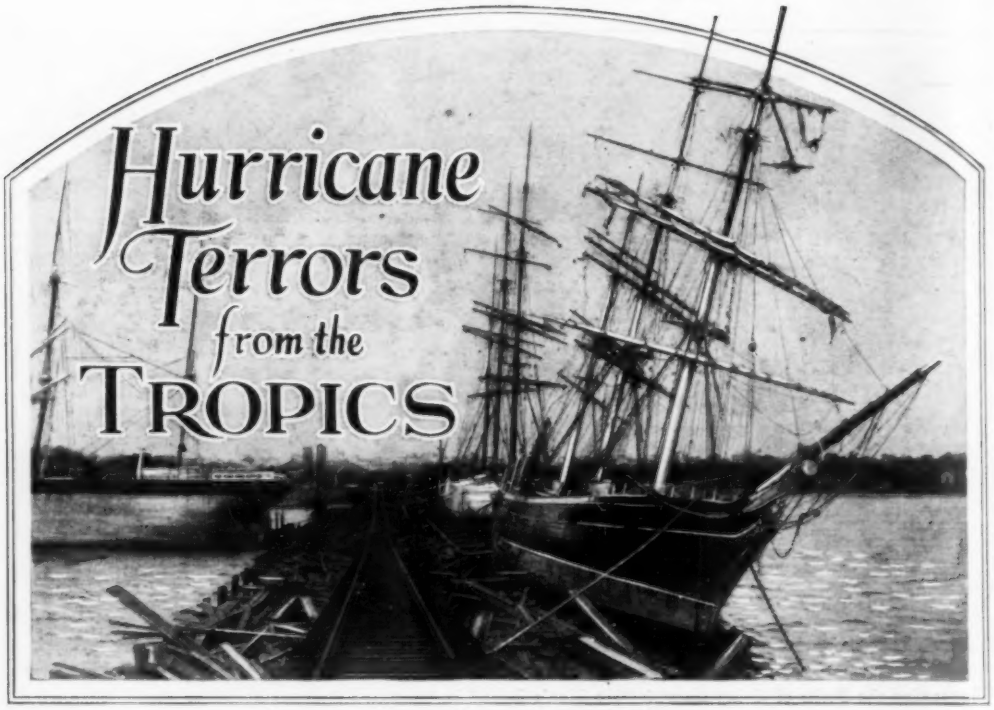
Elementary principles of radio amplification are being used in an automobile factory to inspect surface finishes. Light is directed on the area to be examined and the intensity of that which is reflected is determined as it strikes a photoelectric cell. An amplifier and measuring instruments enable the examiners to tell accurately the degree of polish on the surface. An advantage of this process is that it removes much guesswork and eliminates errors that often are made when reliance is placed wholly on a workman's judgment. In order to find cracks in ground surfaces, too small to be seen even with a microscope, the parts are magnetized and immersed in a solution of kerosene oil having suspended in it very fine iron dust. A magnetic field surrounds the crack and the particles adhere in a peculiar way on a hardened surface which has such a defect.

POLISHED COVER ON STEEL NUT KEEPS OUT RUST



Steel hexagonal nuts, with a covering of brass, copper, nickel, silver or other metals, are shielded from rust and present an attractive appearance on outside work. The nut is tapped all the way through and inspected before the covering is put on.

¶Colombia supplies about one-half of the world's platinum.



Cyclones of the Sea That Occasionally Sweep Inland and Take a Terrific Toll in Southern States Are All Born near Equator

A TERRIFIC gale blew out of the sea all night long, rain fell in solid walls and giant waves washed ships high and dry on the land, eyewitnesses said in describing the recent Florida hurricane. Then, at dawn, the gale suddenly ceased and householders, in bathing suits, waded out to inspect the damage, thinking all danger was over. But within an hour the gale sprang up again, this time blowing in the opposite direction!

The terror-stricken survivors did not realize it, but they had just lived through the passage of the central vortex of the worst terror of the seas, a tropical hurricane. During that hour of deceptive calm they were in the exact center of a vast bowl of raging winds, a bowl that probably measured between 200 and 300 miles across, with winds whirling round its rim in a counterclockwise direction at a speed ranging from sixty miles or so an hour near the edge to 100 to 120 miles an hour near the center.

This bowl, moving slowly toward the northwest, was advancing at a speed of between fifteen and twenty miles an hour, and since the calm of the vortex lasted just about an hour at Miami, it follows that the vortex was some fifteen to twenty miles across. Because the storm approached from the southeast, Miami and southern Florida first felt its northern side, and, since hurricanes in the northern hemisphere always revolve in a counterclockwise direction, the gale blew in from the sea. Then came the center of the storm, with its hour of calm, and again the stricken district was plunged into the gale, but this time the southern side was passing over, so the wind came out of the west.

Some five or six days before the storm, a true cyclone had been born far out at sea, southeast of Porto Rico, probably halfway to the African coast, and in that region that mariners call the doldrums, a belt of calms which stretches for ten to twelve degrees north from the equator. It probably was born somewhere between nine and thirteen degrees north latitude, for, in forty years of observation, a hur-

Below, Street in Miami after the Recent Hurricane; at Right Is a Jumble of Wrecked Houses Ruined in a Galveston Storm

Below, Map Compiled from Weather-Bureau Charts for the Miami Hurricane Period, Showing Location of Storm Center at 8:00 A.M., from the Day Before It Struck Miami Until It Finally Blew Itself Out North of New Orleans; Note How It Slowed Down Until Three Days' Storm Zones Finally Overlapped at Mobile and Pensacola

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Wreckage Left by the Storm at Dania, Florida, One of the Many Small Towns That Suffered Severe Loss

ricane has never formed closer to the equator, because the deflective force of the earth's rotation cannot originate a wind vortex at or near the equator.

North of the new-born storm lay a vast island of heavy air, stretching from the region of the Azores west and south over the sea and over the eastern states, reaching as far south as northern Florida. This high-pressure area is found over the north Atlantic each summer, sometimes falling short of the American coast and sometimes reaching far inland. The cyclones of the tropics cannot break through it, and, since the area moves too slowly to pass in front of them, the hurricanes always sweep northwestward until they can round the heavy air, when they turn northeastward again and continue on their way, often as far as Iceland.

This time—and it proved fatal to hundreds of people and millions of dollars' worth of property—the high-pressure island reached so far inland that the cyclone was driven westward across Florida, over the eastern arm of the Gulf of Mexico, and across southern Alabama, until it finally blew itself out somewhere north of New Orleans. Had the area been smaller, as it will be in late October and November, the storm would have swung northeast before reaching the coast and swept up the sea lanes, taking a heavy toll of shipping, as November hurricanes always do, but missing the land. It might have followed the coast, as often happens, as far north as the vicinity of Boston, and then swept across the Atlantic.

Few people realize the exactitude with which such storms can be plotted, their course foretold, and warnings issued. The weather bureau had this one marked down two or three days before it struck Florida, figured where it would strike, and issued storm warnings. While a hurricane is rivaled only by a tornado in its force and the damage it can do, its actual forward movement is quite slow, only fifteen or twenty miles an hour, as a rule, so that frequently several days will elapse between the first warning and its arrival at a point where it can do great harm.

Two things are necessary to start a tropical cyclone on its way. One is high temperature and the other high humidity, both common in the doldrums. Into the area of expanded, low-pressure air, the winds begin to rush, and then the earth's rotation starts them swirling about a rapidly forming vortex. They swirl faster and faster, and drag more and more air into the motion. Stick your finger into a basin of water and twirl it round and round to form a miniature whirlpool. As the speed increases the whirling water overcomes more and more of the inertia of the water outside itself, until soon you will have the whole basinful swirling around. That is just what happens when a cyclone is born.

The first half of September is the worst period of the year for tropical hurricanes, and the first half of October second. For some strange reason there is a lull during the latter fifteen days of September. Charles L. Mitchell, a weather bureau scientist, who has tabulated and plotted the paths of every hurricane reported

Center and Lower Pictures © P & A; Insert © Pathe

Tall Steel Buildings Resisted the Wind, But Small Boats Were Landed High and Dry in a Miami Park

Top, U. S. Sub-Chaser Driven Ashore by Wind and High Waves, Left on Beach When Sea Receded

Part of Miami's Water-Front Wreckage, with Two Fine Yachts Piled Up against the Bow of a Big Freighter

from 1887, when daily weather maps of the North Atlantic first appeared, down to the end of 1924, discovered there were 239 such tropical storms in those thirty-seven years, and that 149, or sixty-two per cent of them, occurred during the two months of September and October, while seventy-eight per cent were catalogued in the three-month period including August. Not all of these, by any means, reached hurricane strength of sixty miles an hour or more. In fact, the chances are only six to nine that a September tropical cyclone will attain hurricane strength, while in November, when the last of them occur each year, the chances are only one in nine.

They are always accompanied, however, by storm tides, which far outrun the slow-moving storm and tell, sometimes many hours in advance, just where the storm will strike, and by their size give a clew as to its intensity. I. M. Cline, who made an exhaustive survey of tropical storm tides for the weather bureau several years ago, reported that the waves and swells of the greatest strength originated in the rear right-hand sector of the storm and advanced through the smaller waves in front of it, racing ahead in the same direction in which the storm was traveling at the time they started. Because of the tremendous wind velocity where they originated, the waves frequently attain a speed of forty-five miles an hour.

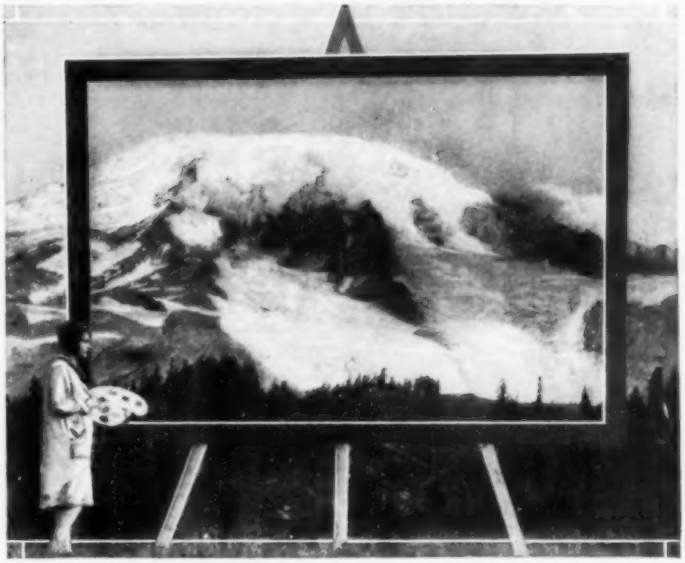
He found also that waves from a hurricane that struck Texas in September, 1919, traveled 800 miles in between fifteen and twenty hours, and arrived well in advance of the storm. The highest water is always a few miles to the right of the point where the center of the hurricane will pass, and high water often extends for 100 to 200 miles to the right of the vortex, while it will be felt for only a few miles to the left.

The paths of the storms are always controlled by the high-pressure area which they are trying to pass, and as this sometimes shifts they often follow strange and erratic courses, occasionally even performing a loop and going back over ground they have already covered. When that happens, though, the loop is always to the left. Most of those charted since 1887 have followed roughly a great horseshoe-shaped course, starting east of South America, coming up toward southern United States, then swinging back northeastward to Iceland and Scotland.

Wreckage of the Causeway Connecting Galveston, Texas, with the Mainland Following the Hurricane of 1915, the Second Disastrous Gulf Storm to Strike This Point

CHIN AS INDEX TO CHARACTER

Receding chins are commonly believed to indicate lack of will power; square, protruding ones, strength and determination, and those with dimples, an attractive personality. But in the opinion of Dr. W. Stanley Wilkinson, an Australian dentist, and other investigators, character is not revealed by the shape of the chin. Its contour rather expresses a much simpler matter, it is believed—whether or not the owner sucked his thumb to excess during the first six months of life. Dr. Wilkinson holds that the round chin is the result of the stunting effect produced on the growth of the lower jaw by thumb sucking. When the habit is not practiced, the jaw normally tends to assume a well developed forward tendency.



Mt. Rainier as It Appears behind Open Frame, as if Transferred to Canvas by a Skilled Artist

RAINIER SEEN THROUGH FRAME RESEMBLES PAINTING

Beauties of majestic Mt. Rainier were emphasized by the simple device of placing a large frame by a roadside several miles from the peak, producing the effect of a painting. The illusion was further carried out by the presence of a young woman with palette and brushes.

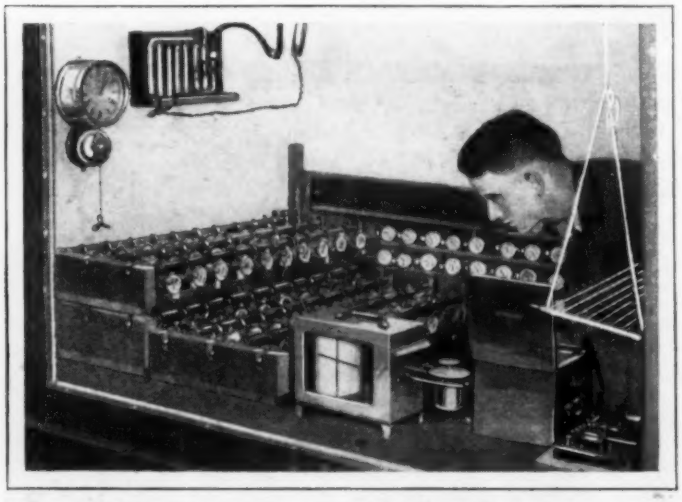
SMALL RACING AUTOS TO RUN ON NORWEGIAN RAILROADS

Gasoline-burning units are being used on several railways to supplement steam trains and now a Norwegian line has ordered a large number of racing cars of English make for service on its rails. The wheels are flanged, a broad windshield protects the occupants and a single headlamp, in front, promotes safety at night. In the event that steam power becomes impractical, railroad tracks will be utilized for motors, it is predicted. A road already has been constructed upon the right of way of an abandoned railway in Colorado.

Racing Autos Built for Norwegian Railroad, to Supplement Steam Traffic

BULLET CLEANS RIFLE BARREL AND PREVENTS RUST

Cleaning rifle barrels after firing is said to be unnecessary if cartridges containing a special, lately introduced priming mixture are used. The substance is said to make the inside of the barrel proof against rust, stain and corrosion. Millions of .22-caliber cartridges were fired to test the mixture and none of the rifle barrels showed any signs of rusting or pitting, it is said.



Watches under Test at Bureau of Standards after Being Repaired by Candidates for Certificates as Experts with Timepieces

TEST WATCHES NINETEEN DAYS TO PROVE REPAIRERS' SKILL

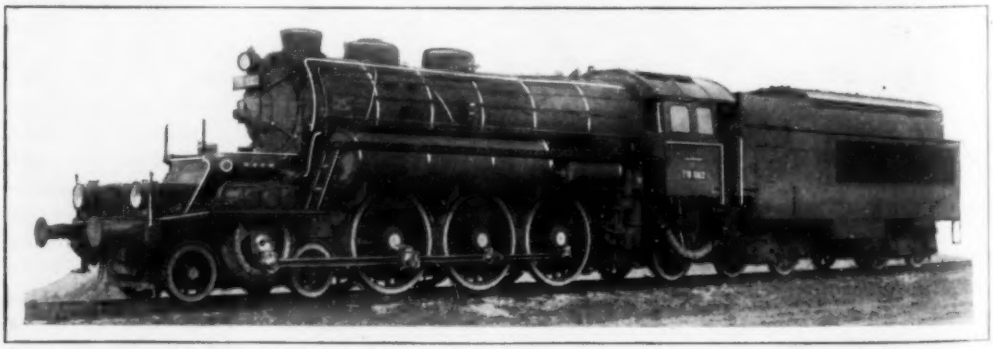
Watches which have been repaired and adjusted by candidates for certificates as experts with timepieces are subjected to rigorous tests at the bureau of standards. For nineteen days they are put through a variety of examinations while any discrepancies in time recorded are noted. The ordeal involves numerous changes of position, subjection to heat and cold and other severe trials.

LOCOMOTIVE RUN BY TURBINE DEVELOPS HIGH SPEED

Calculated to haul heavy trains for long distances at more than seventy-four miles an hour, an express turbine locomotive has been built for the German state railways. Economy of fuel at high speeds, keeping oil from exhaust steam, so that the life of the engine will not be so greatly impaired in reusing water by condensation, and simplicity of operation are claimed for it. A feature of the locomotive is that the tender, besides carrying coal and a store of water to make up for losses by evaporation, is also a cooler to reduce the heat of the water, which is used again in the condensers. The liquid flows through a flexible tube below the engineer's cab into a system of distributing pipes on the roof where it goes to a large number of vertical copper sheets. As it trickles down these, it comes in contact with cool air currents.

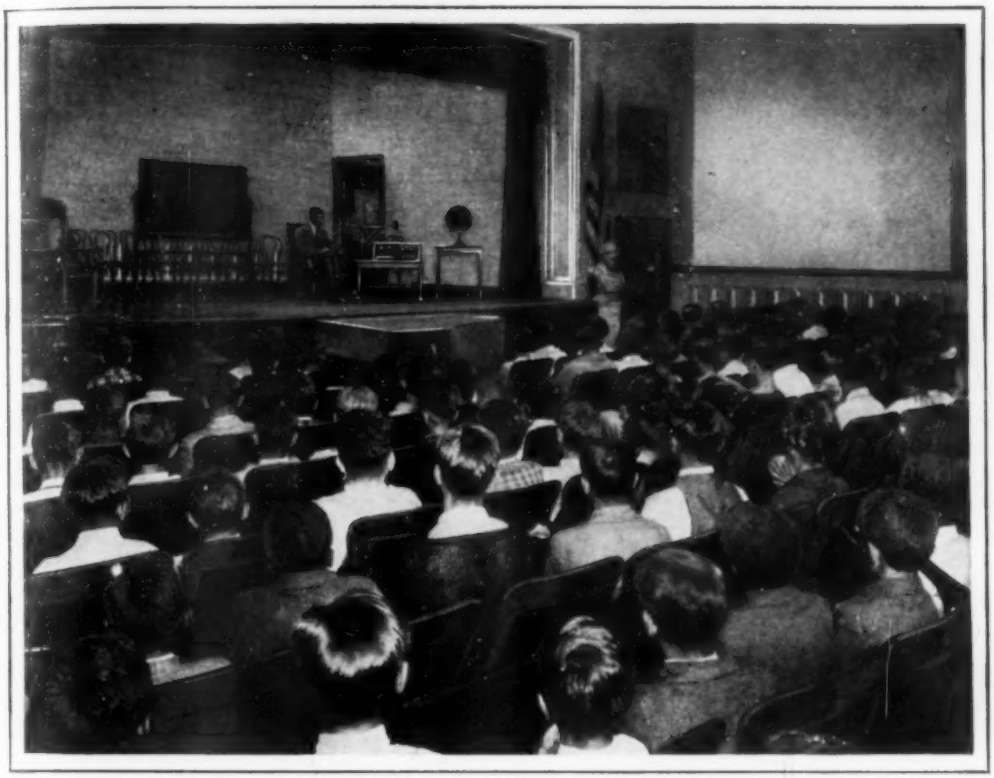
AUTO OILER WITH SIGNAL LIGHT LENGTHENS MOTOR'S LIFE

When the oil supply gets too low, a red light flashes on the instrument board in an automatic lubricating system devised for a popular make of small cars. It is so arranged that the oil is kept midway between the upper and lower petcocks, the level found to give the best results. The system is said to insure proper circulation of oil in the crankcase, thus prolonging the life of the motor, and to eliminate smoke from the exhaust.



Turbine Locomotive for German Railway to Haul Long Trains at High Speed; the Tender Has Cooling Apparatus Indicated at Side to Reduce Temperature of Condensing Water

LESSONS BY RADIO TO PUPILS IN FIVE STATES



Some of the Thousands of Pupils Who Listened to Distant Teacher by Radio; Scene as One of Twenty Lessons Was Being Broadcast from Station WTIC

More than a quarter of a million pupils in schools of Vermont, New Hampshire, Connecticut, Massachusetts and Maine listened to the same teacher during a series of lessons broadcast by radio from station WTIC at Hartford, Conn. The "course" included twenty lectures and, to save time in announcing, the program for each was written on a blackboard.

"FISH ENOUGH FOR ALL WORLD" IN CANADIAN LAKES

Lakes in the barren lands of Canada's northwest territory hold "enough fish to supply the needs of the world for the next fifteen years," according to Pilot C. S. Caldwell, who spent four months in the region with a party of government engineers prospecting for minerals. The expedition flew to the lands between Great Slave lake and Bathurst inlet in a flying boat, said to be the first that ever has visited that part of the country. The ship traveled between 6,000 and 7,000 miles. The prospectors were left to return by river and rail.

EXPOSURE METER FOR PHOTOS OPERATES IN ANY LIGHT

Correct time for exposures with any type of camera is said to be accurately registered on a novel meter. It is held to the eye and, when the right exposure is indicated, a small collar arrangement is turned, registering the adjustments to make in the camera gauges.

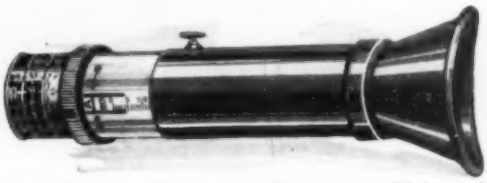


Photo-Exposure Meter with Eyepiece at Right and Turning Gauge at the Other End

Bungalow Apartments on English Coast in Transformed Windmill Tower and Water Tank

OLD WINDMILL TOWER REMADE INTO SKYSCRAPER BUNGALOW

No longer serviceable as a windmill support, an old tower and water tank on the Suffolk coast, Eng., were remodeled into a series of bungalow apartments. The upper rooms were considered especially desirable, as they afforded a wide view.

EIGHTY-THREE DIE IN AIR ACCIDENTS THE PAST YEAR

Poor planes, lack of training on the part of the pilots and stunt flying were responsible for about seventy per cent of the aviation accidents that occurred in the United States in 1925, according to a survey by the Aeronautical Chamber of Commerce of America. There were 112 mishaps. Eighty-three persons were killed and 112 injured. Errors in piloting caused thirty-four of the accidents; lack of landing field facilities, eight; faulty craft, eighteen; stunting, twenty-five; carelessness, six, and unknown causes, twenty-one. Significance is attached to the fact that not a single accident was attributable to lack of weather data. The report states that a majority of the small operators of planes at this time own war-time material, and it is suggested that a strict inspection would result in the discarding of much of the apparatus.

SHOES MEAN LIFE OR DEATH TO MOUNTAIN CLIMBERS

Being well shod is one of the most important factors in climbing mountains, and frequently the wearer's life depends upon the sharpness of the cleats in the soles and the strength of the entire foot support. Fully as important to the careful mountaineer is the fit of the shoes. Foot examinations, following the draft for the World war, showed that proportionately more men in the mountain regions of the west were disqualified on account of pedal ailments than in other sections of the country. This was partly explained on the ground that a combination of rough territory and ill-fitting shoes is doubly injurious to the feet.

Heavy Hobnailed Shoes of Different Types, but All Intended for the Same Purpose, Safety in Climbing Mountains

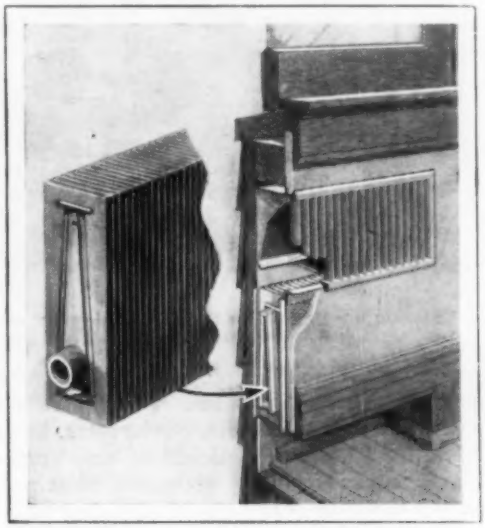
Ready for a Ski Slide in Motorcycle's Wake, a Popular Winter Sport in Canada

SKI RACES BEHIND MOTORCYCLE EXCITING WINTER SPORT

Speeds of ninety miles an hour are attained in one of the latest winter sports, ski racing over hard snow and ice behind motorcycles. While the skier clings to two ropes and endeavors to keep his balance, the cycle rider pulling him must be adept at making quick turns and on the lookout to prevent skidding. Patrons of Canadian winter resorts have found the pastime thrilling and full of opportunities to demonstrate their skill. Relay races add to the enjoyment of the sport.

RADIATORS HIDDEN IN WALLS SAVE ROOM SPACE

Attachable to either a steam or hot-water system, radiator units that may be safely built into the wall and, when installed, are completely hidden from view, have been introduced to save space and to promote better heating. They consist of an outlet grill above and have an inlet opening below. The grill is fitted with a control damper to shut off the heat when desired. The entire unit may be set in a wall or partition only four inches thick. The core of the radiator itself is made of a special metal to which are attached a large number of copper fins. There are no brazed, soldered or welded joints, so that expansion and strain cannot cause leakage. Tests have shown that it safely holds as much as 220 pounds of steam pressure when thawed out with boiling water after it had been frozen for several hours at a temperature of five degrees below zero.



End of Radiator Core Showing the Fins, and Diagram of Typical Installation

When the White Tops

Winter Quarters Mean Months of Hard Work Training Animals, Practicing New Stunts and Repairing Circus Equipment

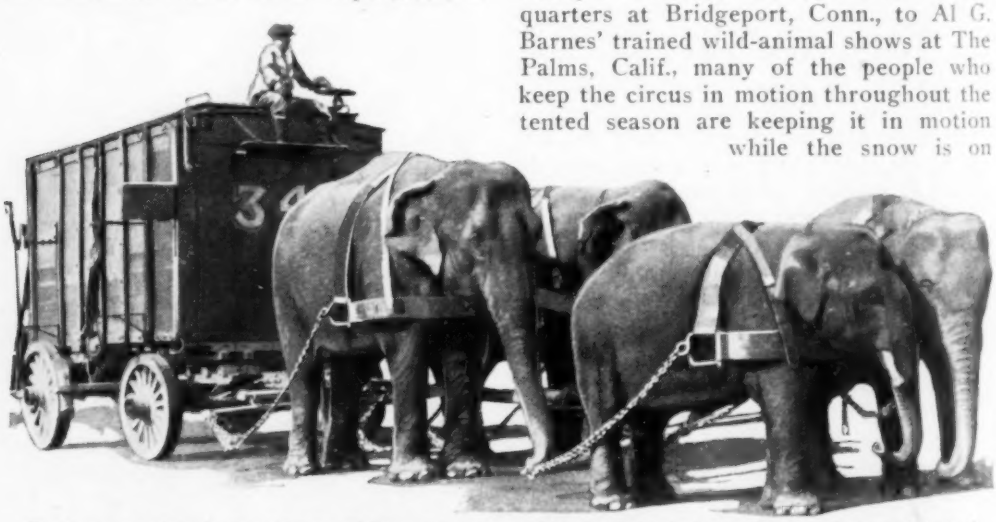
By EARL CHAPIN MAY

THE world's greatest show, like others advertising themselves as such, has reached the end of its tented journey. The official route book, issued annually, relates, among other facts, that it has traveled 14,000 miles between May 1 and November 1. The route has taken the tented city from the Atlantic to the Pacific. The magic canvas city has risen, throbbed, been torn down and moved nearly 200 times.

The boss canvasman and his roughnecks are tearing her down and rolling her up for the last time. The circus band is not playing "Home, Sweet Home," for all showmen know, from experience, it brings bad luck to play "Home, Sweet Home" on the circus lot. But the thousand or more managers, performers, hostlers, cooks, waiters, ticket sellers, musicians, freaks, property men, and what not of the modern gypsy city, are saying farewell to each other and the road. The loaded circus train is about to pull out for winter headquarters.

"Season's closed!" all cry. And the wistful small boy, saying his own farewell to life's greatest joy, wonders audibly, "Where do the circuses go in winter?" For the small boy's information, the fact is here set down that circuses go on forever. The train that takes the circus to winter quarters also takes most of the circus, whether it be man, woman, animal or inanimate material, into intensive winter training.

This training is of diverse kinds. From the Ringling Brothers and Barnum and Bailey's combined shows in their winter quarters at Bridgeport, Conn., to Al G. Barnes' trained wild-animal shows at The Palms, Calif., many of the people who keep the circus in motion throughout the tented season are keeping it in motion while the snow is on the ground. From Peru, Ind., where the Sells Floto and Hagenbeck-Wallace circuses are installed in their acres of steel, brick and wooden buildings, to Beaumont, Tex., where the Christie and Lee Brothers make their winter stand, skilled hands are repairing the ravages of a long season.



Elephants Are Kept in Condition by Helping Out with the Heavy Work of Moving Canvas, Stake and Animal Wagons around the Lot, When Not Busy Rehearsing New Acts for the Tented Show

are Laid Away

Wagons are being retired, and repainted. Tents are being built or rebuilt. Baggage horses are being turned out to pasture. Ring stock are being groomed and tested out for new acts. Wild animals are taking new lessons in the art of entertaining the great American public. New wardrobe is being designed, made up and bespangled. New center, quarter and side poles are being trimmed for the coming battle with the elements; new blue seats, jacks and stringers are being sawed and hammered into shape. Each winter quarters is a humming factory.

The cash replacement value of the twenty circuses that annually tour this country is close to $15,000,000. It costs more than $5,000,000 to winter, repair and generally renew these circuses. So much for the physical side of the circus business. The horse and animal trainers and the men and women artists who thrill the millions that pay their way into the white tents, have their own methods of training during the winter.

In and around Bridgeport, Mable Stark, if she is scheduled to wrestle her tigers during the season to come, keeps two of her baby pets in her comfortable apartment, where, in off-hours, they snooze in her lap. Mr. and Mrs. Emil Pallenberg, premier bear trainers of the world, are at home in a Connecticut village—at home with their bears, which have apartments of their own. When not mastering the roller skates or two-storied bicycles, the Pallenberg bears are as comfortably ensconced as any fancy thoroughbreds. George Denman, dean of elephant trainers, is also at home, in his great elephant barn where, with block and tackle and wise words of command, he teaches forty pachyderms to stand on their heads or hind feet in ponderous unison.

Down in Central City park, Macon, Ga., Steve Batty is practicing, in the steel training arena, a thrilling fight with "Wallace, the Untamable Lion" of the Sparks' circus, while Franz Woska rehearses his tigers or leads one into the open where Mrs. Clifton Sparks and Clifton Sparks, Jr., pal with the royal Bengal pet and M. Burns is training Bibb county pigs.

In the ring barn at West Baden, Ind., Robert Thornton or Carlos Carreon, assisted by Mrs. Thornton and Mrs. Carreon, are breaking in new liberty and menage horses for the John Robinson show, soon to go on tour for the one hundred and second consecutive year.

There is no rest for circus people winter or summer. But all the winter work is done without the stimulus of crashing circus bands, without the color of silken tights, without the excitement engendered by thousands of towners, craning their necks from tiers of blue seats. Circus training, in the winter time, is an unemotional affair.

If you happen into the famous Davenport ring barn in Cicero, a western suburb of Chicago, you may find a man in

Miss Ione Carl Spends Her Winters Wrestling with a Man-Eating Royal Bengal Tiger, with Leather Suit, Cap and Gloves to Protect Her against Casual Scratches

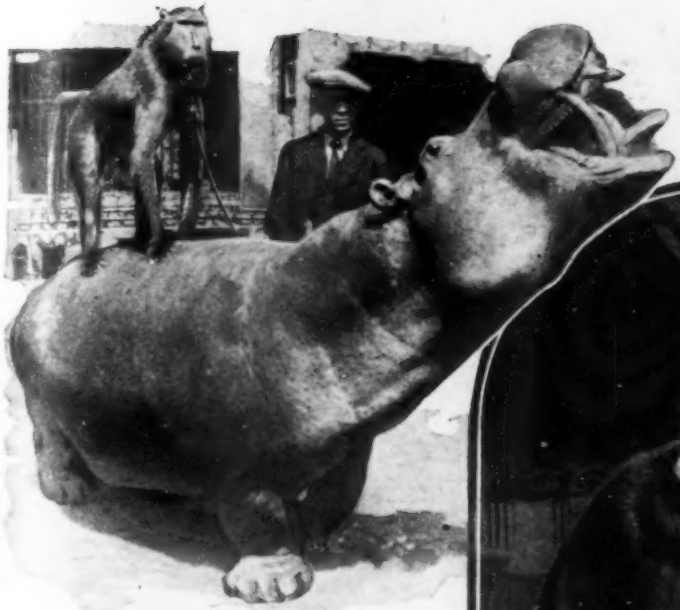
overalls methodically cracking his long whip, while a broad, sleek "rosin back" lopes gently around the forty-two-foot ring. On the back of that fat horse may stand a young woman in sweater and bloomers, tripping the light fantastic or even attempting back somersaults. Her hair is done up tight. Her expression is tense. Her horse discloses a most annoying tendency to hump just before the lady wants to take off for another backward mid-air turn. "Drat the beast!" she exclaims, or phrases her remarks more vigorously. For when a horse humps it elevates its hind parts to most prodigious heights. A hump may spell disaster to the most experienced equestrian. Humping is a bad habit, difficult to cure. So our young lady does not kiss her hands or flaunt her tarlatan skirts at admiring throngs. She says, "drat the horse!" or some other unconventional thing.

A rather dispiriting inclosure is a ring barn. Of wood or brick, with windows not too well cleaned, and, perhaps, no heat but from an ancient stove in one far corner—near which the shivering artist must change her clothes—the ring barn is undeniably a place to work. There's nothing to inspire the equestrian but a grim determination to be the greatest of her kind.

Or, perhaps, one wanders to Bloomington, in central Illinois, and on its outskirts finds a great, wooden structure known as Eddie Ward's training barn. There, amid a maze of rigging, ropes, trapeze bars and nets, boys and girls in rompers or faded, threadbare tights learn to fall into the net or execute the "hock, and one-and-a-half, with pirouette and half return" far above good Mother Earth. Eddie is training his flyers for another season under canvas. But in that high-arched, gloomy barn the crowded tents, smell of tanbark, and lilting music of the circus waltz all seem years and millions of miles away.

The towners who view the big show with varying degrees of interest know nothing of the "mechanic" without which no circus would be such. For riding acts the mechanic is a belt around the rider's waist. This belt is swiveled to a small iron ring, which, in turn, is fastened to a rope. This rope runs upward through a pulley at the end of a crane. This crane revolves around a pole, standing in the center of the training ring. The other end of the rope is held in the riding master's hand. When the beginner leaps into the air to turn a somersault the trainer pulls upon the rope. And when the rider, coming down, misses her uncertain footing upon the rosin back, the trainer gently lowers her to safety on the ground, or on her charger when it comes around the ring once more. Fine training for the stomach muscles is the mechanic, used ever since circuses began.

In Eddie Ward's training barn the mechanic serves a loftier purpose, although it also serves a similar end. The begin-

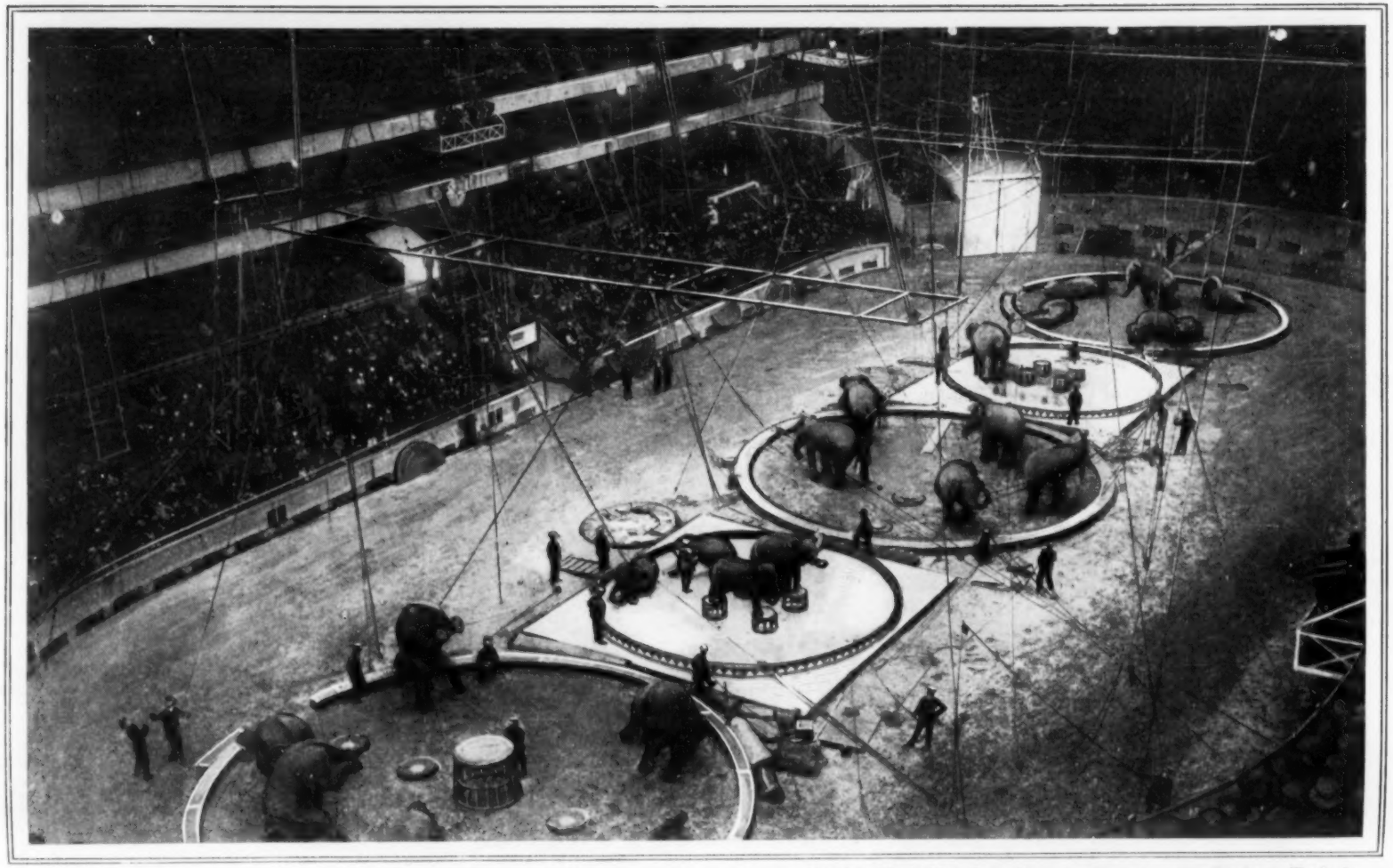


Even the Hippo Comes Out of His Water Tank to Take a Lesson in Carrying a Baboon around the Arena

The Bear Wears a Muzzle While Being Taught the Rudiments of Wrestling behind the Scenes at Winter Quarters; Left, Naida Miller on Her Wire

It Takes Months of Patient Training to School the Horses to Remain Motionless in the Tableaux of the Statuary Acts

Courtesy Burke & Atwell



First Show of the Season. When the "World's Biggest" Opens in Madison Square Garden; Several Months' Work Has Been Spent in Perfecting the Elephant Herds in Juggling, Dancing, Acrobatics and Music, All to Furnish a Few Moments' Enjoyment in the Arena

Robert MacPherson Spends His Winters at the Hagenbeck-Wallace Quarters Taming a Herd of Bengal Tigers in the Big Steel Cage; They Are Even More Dangerous than the Lions

ner who essays to do a double somersault from a trapeze to the catcher's hands flies through space, but as the beginner flies, Eddie and some trusty lieutenant, each holding a rope running over a pulley in the great barn's roof, pull on a belt around the budding flyer's waist. And if that flyer misses his catch, he comes down gently, as Eddie and his lieutenant slowly release the rope. Thus are the necks of young flyers saved for the future show.

All the world's a ring to circus people and all people, of worth, merely performers. The greatest danger that faced the circus performer of the olden days—the danger of going stale from lack of public appearance—passed with the last decade. The growth of vaudeville and the increase in winter circuses, especially those played "under auspices," have opened a new field of endeavor for the men and women of tights and spangles.

Training barns must always exist for beginners. But once the performer has attained unusual excellence he or she works both winter and summer. Stars are always in demand. Lillian Leitzel—as a feature with the Ringling Brothers and Barnum and Bailey combined shows, she throws her body over her shoulder a hundred times with one wrist in a rope loop—plays metropolitan vaudeville theaters from December to March, then goes directly to the spring opening of the big show in Madison Square garden.

So great has been the development of the indoor or winter-circus idea during the past few years that riding acts and even big flying acts are in demand through the winter months. The erection of such buildings as the Cleveland auditorium, and the eleventh-hour discovery that most of our national-guard armories are big enough to house a three-ringed snow-time show, have materially increased Christmas cheer for thousands of circus performers. The lot of the kinker, as the circus performer is sometimes called, is far from a hard one.

There is still required during the period between fall and spring a vast amount of patience and persistence upon the part of Roy Rush, for example. Roy teaches horses and dogs to remain motionless during the "statuary acts" in the Big Show. He does this by tenderly manhandling his animals, then rewarding them with apples or sugar or petting.

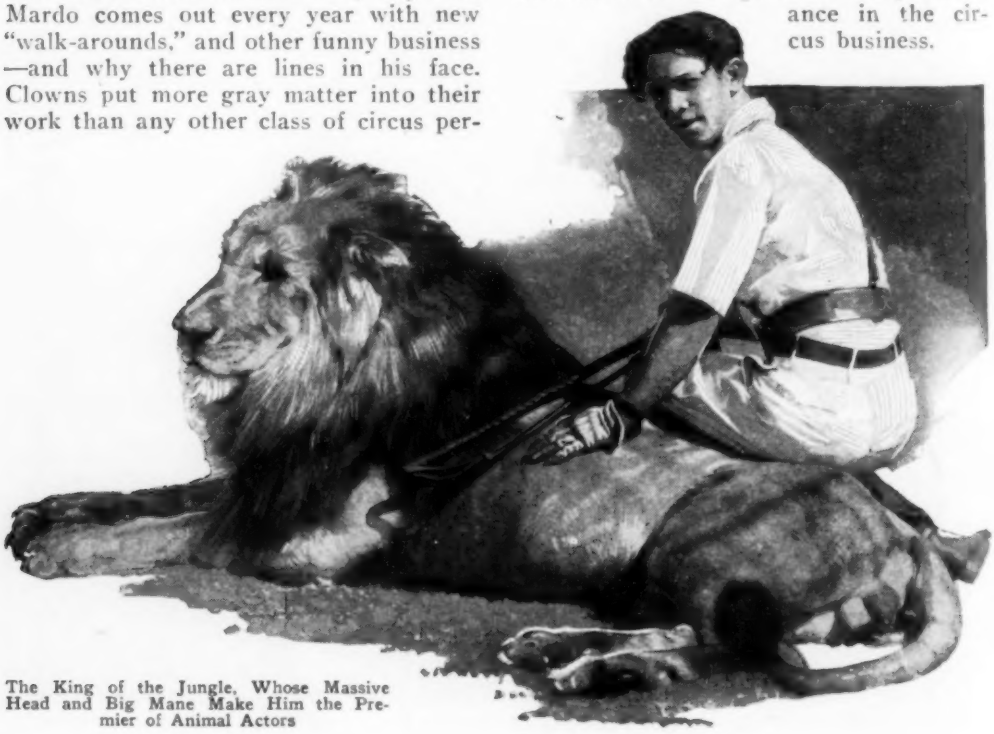
The trained-seal act is the stand-by of many a traveling circus, because the seal is a natural-born actor. It loves the limelight and dotes on applause. By precept and example and judicious distribution of fresh fish, a trainer can make a troupe of amateur seals qualify as professionals in about three months.

A good elephant trainer can break in a herd of young bulls fresh from Asia in about three months, depending upon the individual elephant's temperament, for elephants are highly individualized. But most are keen about showing off and once a bull has learned its routine it is apt to go through a performance without the trainer's cue. All trainers as well as all performers are constantly on the alert for new business. The Charleston had hardly got under way before Bob Stickey IV, scion of one of the oldest circus-riding families, perfected a Charleston on twelve-foot stilts. Bob has been working steadily in theaters ever since. He could get a handsome salary with a circus if he cared to troupe under canvas again.

This matter of originating new business is of paramount importance to all circus performers, save and excepting only those who are so pre-eminent in their particular feats that the public demands their annual repetition. Clowns are everlastingly driven to think up new and funny stunts. That is how Buck Baker came to originate the trick automobile that goes backward and forward at word of command without the touch of human hands; why Pete Mardo comes out every year with new "walk-arounds," and other funny business —and why there are lines in his face. Clowns put more gray matter into their work than any other class of circus performer. But all of them do a lot of studying winter and summer. A new style of somersault; a new head balance on trapeze; a new method of sliding down a wire upside down—all these are literally meat and drink for the "kinkers."

And first, last and all the time, circus people must keep in condition and keep down their weight. This is a more serious matter than the layman suspects. The average star circus performer actually appears in the ring less than twenty minutes a day. He does a deal of limbering up, before he goes on, summer or winter. But outside of that he takes little exercise.

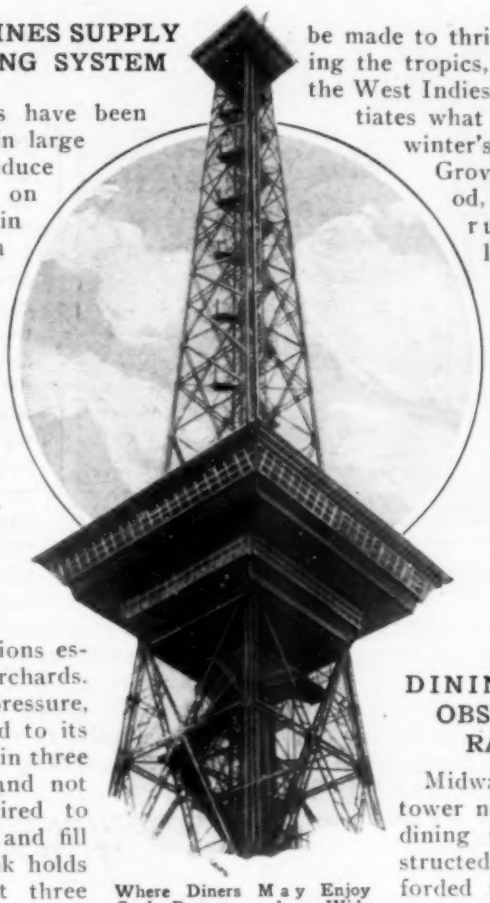
Contrary to most non-professional opinion, circus performers have vision and imagination. Otherwise, they would not be up in their profession. If you happen to see in some circus a pretty and graceful young lady billed as Naida Miller, and note her in silks and satins waltzing on the light wire to the tune of "Over the Waves," just remember that it took the better part of six years in some cold training barn or an equally uninspiring gymnasium to perfect an artistic act which lasts less than six minutes. That's the difference between practice and performance in the circus business.



The King of the Jungle, Whose Massive Head and Big Mane Make Him the Premier of Animal Actors

ORCHARD PIPE LINES SUPPLY OIL FOR HEATING SYSTEM

Oil-burning heaters have been used for some time in large fruit orchards to reduce damage from frosts on chilly nights, but in large groves so much time is consumed in filling the firepots that extensive harm is often done before the heaters can be replenished. This difficulty has been surmounted in a large California orange district by installing a 600,000-gallon reservoir for each 1,000 acres and piping the oil to various filling stations established in the orchards. Because of the high pressure, a wagon can be filled to its capacity, 600 gallons, in three minutes, it is said, and not much time is required to drive to the heaters and fill them. The main tank holds sufficient oil to last three nights. During the frost season, night riders patrol the groves and sound an alarm when the temperature descends to the danger point. The big reservoir is refilled from a railroad siding, two miles distant.



Where Diners May Enjoy Cool Breezes and a Wide View; Exterior of the Radio-Tower Cafe, near Berlin; an Observatory Is at the Top

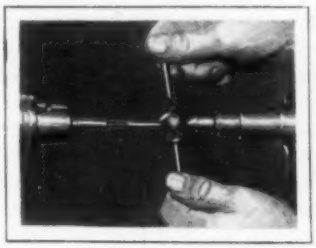
RUBBER TREE IN FLORIDA YARD TWENTY-FIVE YEARS OLD

Discovery of a Brazilian rubber tree, twenty feet high and three or four inches thick, in a Florida garden near Palm Beach interested plant experts recently, as this tree usually flourishes only in warmer climates near the equator and experiments in raising rubber plantations in Florida have not proved successful. The tree was evidently about twenty-five years old and had lived through cold snaps that had killed other trees. The find indicates, some authorities hold, that the hardiest rubber trees might possibly be made to thrive in regions bordering the tropics, such as Mexico and the West Indies, and further substantiates what was shown after last winter's frost at Cocoanut Grove. In that cold period, Hevea, the Brazilian rubber tree, suffered less than the Mexican variety, although the former was considered much more sensitive to low temperatures. A search was made by department-of-agriculture men through other towns in Florida for more Brazilian trees that may have been set out as ornaments and lived.

DINING SALON AND OBSERVATORY ON RADIO TOWER

Midway on a high radio tower near Berlin, a spacious dining room has been constructed. A clear view is afforded from every side, and windows are arranged to allow full benefit of the breezes when desired or may be tightly closed for protection. The cafe is reached by an elevator and by stairs which continue to the top of the mast where an observatory is provided.

LIGHTWEIGHT TAPPING WRENCH ALSO WORKS IN LATHE



Taps are firmly held independently of the handle in an easily manipulated wrench that is said to keep a perfect center and take a wide range of taps and reamers. It may also be adapted for use in the lathe.

© Herbert Photos

Carrying Baron Okura across Rope and Bamboo Suspension Bridge over Deep Ravine in Japanese "Alps"

OLD ROPE AND BAMBOO BRIDGE AIDS TRAVEL IN JAPAN

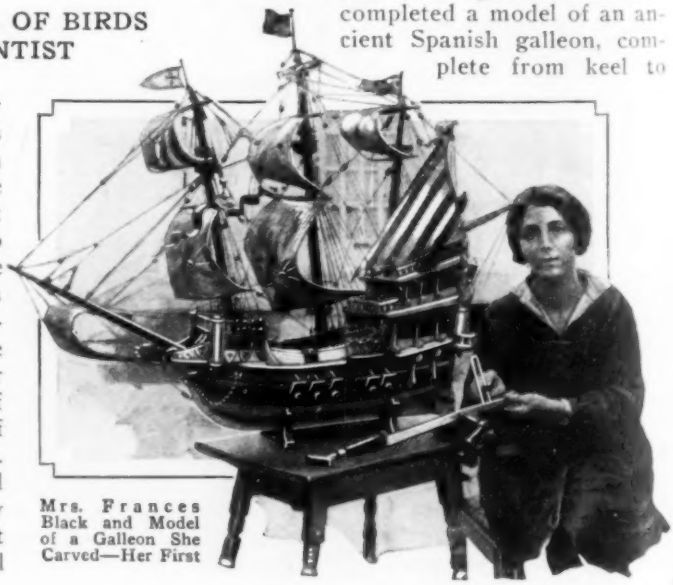
Spanning a deep ravine in the Japanese "Alps," is a primitive suspension bridge fashioned of rope and bamboo. It is securely rigged but narrow, and crossing is not without its perils to the inexperienced, although the natives walk over it with ease. Some of the Japanese ride in the old-fashioned conveyance, the "kago."

WONDERFUL TRAITS OF BIRDS TOLD BY SCIENTIST

A species of bush turkey knows how to ventilate its nest; the male of the satin bower bird seems to have an artistic sense, for it throws out flowers that do not appear to harmonize with the color scheme of its home, and others play, apparently make plans for the future and indulge in war dances. These are some of the marvelous traits of birds as described by Dr. Lucius C. Pardee, a Field Museum of natural history lecturer. He asserts that many of the feathered tribes are big-brained and learn quickly. One of the smartest is the honey guide, a species from Africa. It is fond of the sweet but unable to get it from the bees' nests. It therefore leads a man, usually a porter from some traveler's caravan, to the bees by making a great disturbance to attract attention, or it enlists the help of the ratel, a little animal with a skin so thick that bee stings do not penetrate it. In the confusion that follows the robbing, the bird usually gets its share of the honey. A kind of plover hops into alligators' mouths and robs food from the reptiles without apparent fear of being bitten. One group of birds punishes theft, crows hold "trials" and sentence culprits to death, and others have elaborate courting ceremonies.

WOMAN CARVES SHIP MODEL WITH FEW TOOLS

Working with only a few tools available in her home, a Los Angeles woman has completed a model of an ancient Spanish galleon, complete from keel to



Mrs. Frances Black and Model of a Galleon She Carved—Her First

masthead. The builder had never been interested in ships until she saw models pictured in a book her young son was reading. Her model is forty-eight inches long from bowsprit tip to stern and stands thirty-six inches high. All the material that went into it cost less than five dollars.

NEW USES FOR SULPHUR

From his research and study of sulphur, started as a hobby, an eastern chemical engineer has found many new uses for the mineral. By mixing in an alloy, he molds it into vases and urns that closely resemble bronze but are much lighter. Soft wood is made hard and durable after immersion in a bath of molten sulphur and the substance is used to coat a base of flannel cloth in molding horns for radio sets and phonographs. Cheap toys of paper and wood pulp become stronger after treatment in a bath of sulphur, and the mineral has been found to add great strength to concrete products. One of its most important uses is for covering underground pipe. Tests have shown that a jacket of cloth and sulphur, about one-eighth of an inch thick, wrapped around a pipe, shields it from rust, while other sections, not so protected, become pitted and worn. This has been determined by examination, once a year, of some twenty pipes laid in different parts of the country from Maine to California. Sulphur resists acid and water and, although it burns, is not easily ignited.

© Herbert Photos

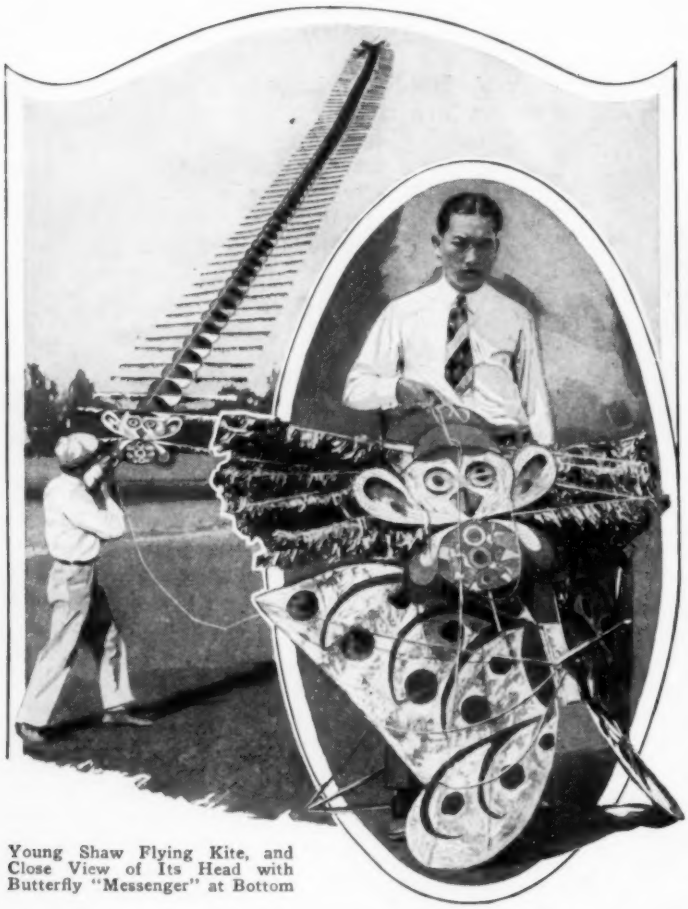
Easing the Landing from a 100-Foot Dive; Using Toy Balloons for Part Support to Prolong the Thrill

TOY BALLOONS AID DIVER IN PROLONGING THRILL

Holding a huge bunch of toy balloons, which slightly decreased the rate of his descent, a diver in an eastern water carnival introduced a novelty in leaping from a 100-foot tower. The slow fall prolonged the thrill of the spectators.

EQUINOX NOT CAUSE OF STORMS

Stormy weather and the equinox, the time when the sun crosses the equator on its journey northward or southward, are closely associated in many minds, but examination of records show that there is no connection, and weather authorities declare that the sun's movement at that period has nothing to do with storms. An unusual amount of rain and some wind in the region around Chicago during the five days from September 20-24 were cited as evidence of the effects of the equinox last fall, but Prof. Henry J. Cox, senior observer of the weather bureau, explained that there was no relationship between the storms and the sun's position. The records since 1872 showed that there was no rain at all during most of the five-day period each year, and on only four days during the interval was there more than an inch of rainfall in any one twenty-four hours. The highest wind velocity recorded during the period, over ten years, did not exceed twenty-three miles an hour. "There is no more likelihood of a storm just at the equinox than a few days earlier or later," Prof. Cox declares.



Young Shaw Flying Kite, and Close View of Its Head with Butterfly "Messenger" at Bottom

EIGHTY-FIVE-FOOT KITE HAS BLINKING EYES

Lee Shaw, sixteen-year-old Japanese school boy of Los Angeles, has won considerable notice for the marvelous kites he constructs. The one he considers his masterpiece is in the form of a huge dragon, eighty-five feet long and brilliantly colored. It flies with the head toward the ground, the flapping tail extending upward, the reversal of procedure in ordinary kites. A feature of the design is the arrangement of the eyes, which have movable centers that give the effect of winking. Another innovation is a butterfly figure, four feet across, that can be made to soar up on the string as though attacking the dragon.

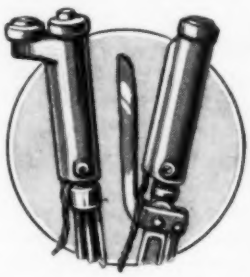
¶At one time, physicians prescribed goldenrod pollen to stop bleeding.

INDIANS PRODUCE MUSIC FROM ACORNS

An unusual musical instrument is the string of acorns fashioned by members of an Indian tribe The nuts are tuned according to size and strung together in the order of the musical scale. The player takes one end of the string in his hand and holds each acorn in turn between his teeth. Using the other hand, he swings the string and pulls it taut. This causes the acorn to vibrate and produce a clear note.

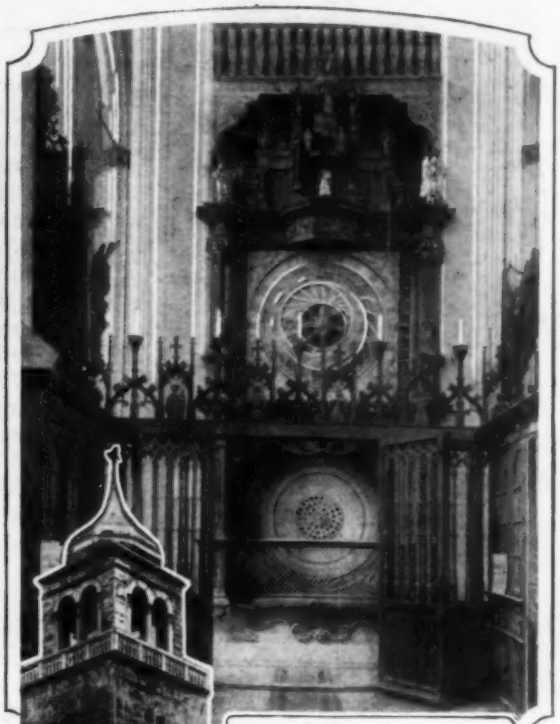
EMERGENCY-BRAKE HORN SWITCH AID TO SAFETY

When an emergency requiring the use of the hand brake arises, it is usually sufficiently urgent to necessitate a firm grip on the steering wheel rim with the other hand. In such circumstances it is impossible to reach the horn button, even though the emergency may demand a warning signal. To meet the difficulty, an English manufacturer has introduced an extra horn button which attaches to the top of the emergency-brake lever, where it can be pressed by the thumb of the hand using the brake. The button is connected in parallel to the regular horn-button circuit so that either one operates independently of the other. Two types of mountings are supplied, one for brake levers with a button release for the locking pawl, and another for the side-lever type.

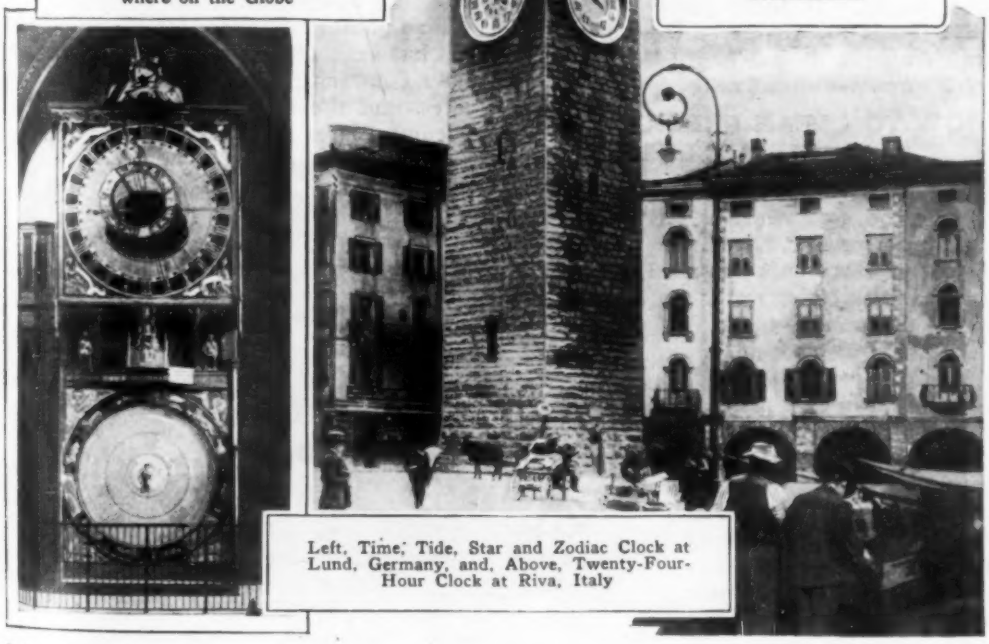


FAMOUS CLOCKS SEEN IN ALL PARTS OF THE WORLD

Austrian Clock That Tells Year, Month, Day and Time Everywhere on the Globe



Astronomical Clock in Lubeck, Germany, That Shows Time, Tides and Constellations



Left, Time, Tide, Star and Zodiac Clock at Lund, Germany, and, Above, Twenty-Four-Hour Clock at Riva, Italy

© Keystone View Co.

Angel Shark Caught off Catalina Island; Name Suggested by Winglike Fins

RARE ANGEL SHARK CAUGHT OFF CALIFORNIA

One of the prize catches of the season off Catalina island was an angel shark, a comparatively rare variety distinguished by its winglike fins. It is regarded as among the least harmful of all the 150 and more species of sharks and is thought by some scholars to be a connecting link with the rays, an ocean tribe resembling the sharks. It feeds partly on smaller fish, but is too scarce to work heavy inroads on the desirable supplies.

HOW TO CLEAN PRECIOUS GEMS TO PRESERVE LUSTER

When diamonds lose their sparkle, they should be first washed in warm, soapy water for a minute or so, dried on clean soft flannel, then rubbed with toilet water and set aside for forty-eight hours. Water should never be used on turquoises. All they need is application of a methylated spirit, with a soft cloth, and a brisk rubbing. This treatment is also good for pearls, which rarely should be cleaned with water. A little whiting on a long camel's-hair brush, followed by a polish with chamois leather, is also effective. Great care should be used in cleaning opals, as they are easily cracked if in too close contact with heat. Several preparations are on the market for renovating them, and directions in applying these materials should be followed strictly. Jet is cleaned with a little good olive oil applied with a soft cloth. Plain jewelry can be brightened in warm, soapy water and polished with chamois after being wiped dry. A bright day should be chosen for cleaning gems, because dampness and lack of light make them appear at their worst, so that their defects are not so easily determined. When rubies, pearls and other precious stones seem to have lost their beauty to such an extent that cleaning appears to do no good, renovation by experts will often restore their original life and color. Sapphires, for instance, are sometimes restored by chemical baths and exposure to sunshine. When turquoises change from a beautiful blue to a sea-green, the original hue is often regained by "skinning" and repolishing them.

CAMERA AS LARGE AS AUTO USED AS AN AD

Built as an exact reproduction of a "kodak," an automobile body designed by a Maine photographer for his car advertises his business wherever he goes. The bellows contains racks for camera and supplies, and the autographic slide opening accommodates the windshield.

Heralding the Approach of Photographer, This Camera-Bodied Auto Attracts Wide Attention and Carries Quantities of Supplies

SILK FROM FISH SHELLS

Durable fibrous material, said to be stronger than real silk and fully as lustrous, has been prepared from insects and shellfish, according to reports from Germany. The basic substance used is "chitin," a white horny material found in the outer covering of various insects, crustacea and other invertebrates. In the bodies of these creatures it gives a certain resisting power in the absence of skeletons, and its durability is evidenced by the fact that specimens are preserved for a long time without artificial means after they have been pinned to cases and display cards. Two scientists of a German institution made a preparation from chitin and finally succeeded in spinning it into fine, shining threads which can be woven into many fabrics.

Installing Pipes for Skating Rink in Coliseum; They Can Be Emptied Quickly and Ice Thawed with Steam

ICE RINK AND BALLROOM ARE COMBINED IN ONE

A combined dance floor and ice rink, 180 feet long and eighty feet wide, recently was completed in Chicago's famous Coliseum, scene of many political conventions. The combination was made possible by an arrangement whereby the ammonia cooling system can be cut out, the pipes emptied and live steam forced through them to melt the ice. In two hours the floor is ready for dancing.

SNOWPLOW ON MOTOR TRUCK THROWS TO BOTH SIDES

Snow is hurled to one or both sides of the roadway by a rotating plow on a motor truck. This is effected by a pair of three-arm fan blades which may be turned in the same or opposite directions. To afford the driver a clear view ahead, a large sighting pipe extends from the seat. Practically all of the truck is tightly inclosed so that the cold and flying snow are kept out of it effectively.

Snowplow Truck, Showing Fans and Sighting Tube

¶Write our Bureau of Information if you wish to know who makes or sells any article described in this magazine; the service is free.

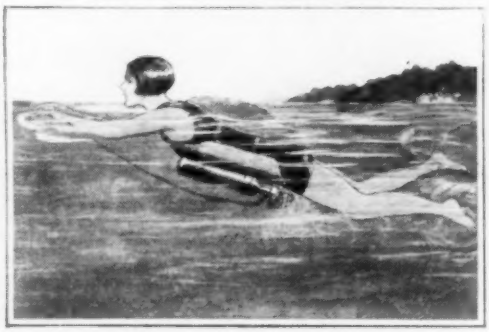
Wide Double Highway in Michigan, with Car Tracks between One-Way Pavements, Provides Lanes for Slow, Medium and Fast Traffic; the Road Connects Two Auto-Building Cities

WIDE ROAD FOR AUTO TRAFFIC HAS LANE FOR HORSES

Two hundred feet wide and with an electric line between the two concrete roadways for automobiles, a "super" thoroughfare has been completed between Detroit and Pontiac, Mich. It extends a distance of eighteen miles and the outer right-hand tracks on each roadway are open to horse-drawn vehicles, which must not enter the other lanes. The maximum speed for traffic on the automobile divisions is twenty-five miles an hour.

ENGINE TO AID SWIMMERS IS RUN BY AIR

A propeller driven by compressed air from tanks and to be strapped about the body was recently patented by a Denver man as an aid in teaching swimming. His device consists of a canvas breastplate, reinforced with light flexible ribs, and with clips to hold the air tank and motor, the propeller being protected by guards to save the wearer's legs. A rubber bag fits over the swimmer's back and is inflated through a valve to help sustain the extra weight of tank and motor.



Air-Driven Motor for Swimmers

THREE-FIFTHS OF ALL RADIO STATIONS ARE IN U. S.

The United States has three-fifths of the world's broadcasting stations and five times more receiving sets than are in use in any other country, according to a survey by the department of commerce. That foreign nations are rapidly increasing their radio equipment is shown by the fact that, last year, radio apparatus exported from this country were valued at $10,000,000, eighty per cent more than the value of the total exports in wireless in 1924 and ten times the total for 1921. The United States is the only important country where the radio fan

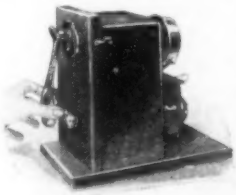
can listen in free. A license fee of one franc per year is charged in France, $18 in Salvador and $13 in Lithuania. In the British Isles, the fee is ten shillings, and in Sweden about $2.70.

ENERGY EXPENDED BY MUSICIANS MEASURED

Tests in Vienna are said to show that the amount of energy expended in whistling, speaking, singing and in the playing of brass instruments is comparatively slight. Pianists and players of stringed instruments consume much more energy, it was found. The director exerts relatively little. The measurements were made by placing tight masks and rubber hoods over the heads of members of an orchestra and of a number of men and women singers. Meters were so adjusted that the amount of energy expended while the persons were performing could be judged.

DOOR KNOCKER RINGS BELL AND LIGHTS LAMP

A door knocker that not only knocks but rings an electric bell and lights a small lamp, which remains burning until it is switched off by the opening of the door, solves the problem of utilizing an attractive old-style knocker, and yet being able to hear it all over the house. From outside the knocker has nothing to show that it is, in reality, only the switch of an electric doorbell.



LOST FORTUNES IN RADIUM FOUND WITH AMBER ROD

One of the difficulties in using tiny needles of radium in treating diseases is that the costly little "splinters" are frequently lost and, until found, represent not only a considerable deficit, but a possible danger, as the emanations are likely to cause serious burns when improperly applied. However, an efficient little instrument has been devised to help search

Electroscope in Use While Hunting for Lost Radium, and Closer View of Another Type

for these missing needles. With the aid of it, a southern professor has won fame as a "radium detective" and has recovered more than $20,000 worth of the substance. The detector is essentially a small glass box containing an amber rod to which gold leaf is attached. When a hunt is on, the knob at the top of the rod is electrically charged simply by rubbing it. This causes the leaf to stand out. But if the instrument is brought close to radium, the gold quickly moves back to its original position, due to the action of the radium emanations, in breaking down the electrical charge. After the searcher has picked up a clue to the lost needle, he rubs the rod and watches the leaf closely while moving the finder about. In one instance, a radium needle was discovered in a pile of ashes.

Lost Auto-License Plates Are Placed on This Rack When Found, to Aid Owners

LOST AUTO-LICENSE RACK AIDS MOTORISTS

The police department in an eastern city has provided a rack for lost license plates so that motorists may be spared trouble if they happen to lose the tags. The rack is placed in front of headquarters, where persons may call for their plates, identify them and take them away. The plan is also an aid in tracing stolen cars, as persons finding license plates are urged to bring them to the police who are sometimes able to get clues to the thieves from the place where the tag was found and fingerprints on it.

¶ Buggy whips valued at $296,270 were sold in this country last year.

HALF OF DEATHS FROM FIRE OCCUR IN HOMES

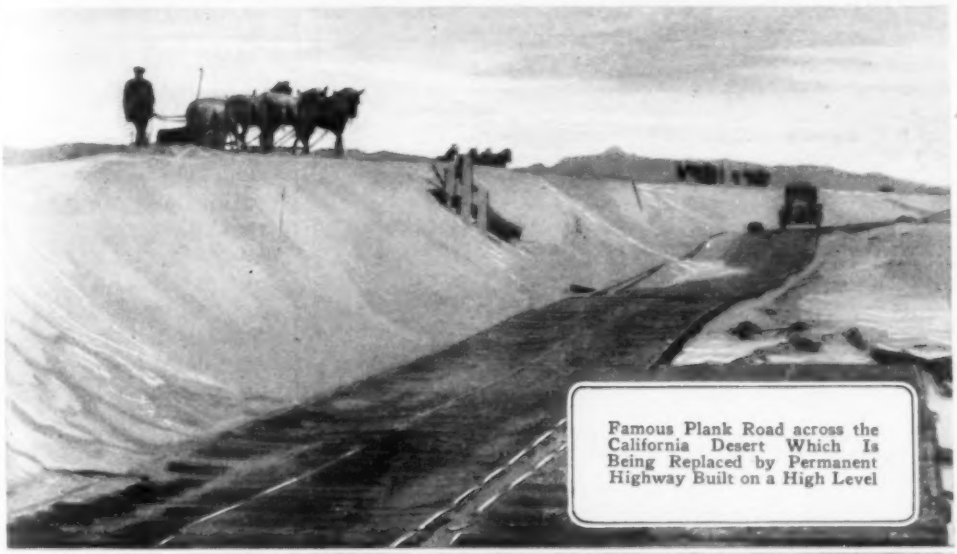
There is a cry of "fire" in somebody's home every three minutes, investigators report. Sometimes the damage is slight, but often the results are serious and, each year, millions of dollars' worth of property are destroyed and more than half of the 15,000 annual human toll of fire in this country is taken in the homes. Defective chimneys and flues are the chief cause, reports of the national board of fire underwriters show, being responsible for eleven per cent of the total. Sparks on wood-shingle roofs cause nine per cent. Next come stoves, furnaces, boilers and their pipes. More than 700,000,000 matches are struck every day in the United States or about 500,000 a minute. Carelessly tossed aside, these and tobacco stubs prove costly hazards. About five per cent of the household fires are caused by petroleum and its products. Oil stoves are improperly operated or are knocked over, but the garage is held the chief offender. If the total annual fire loss were averaged among all the dwelling-house fires, it would be sufficient to provide enough $10,000 homes to take care of the population of Bridgeport, Dayton, or Dallas, statisticians assert.

ELECTRIC LAMP HELD IN MOUTH LEAVES HANDS FREE

Especially Useful in Developing Pictures; the Lamp, Held in Teeth, Permits Free Hand Movement

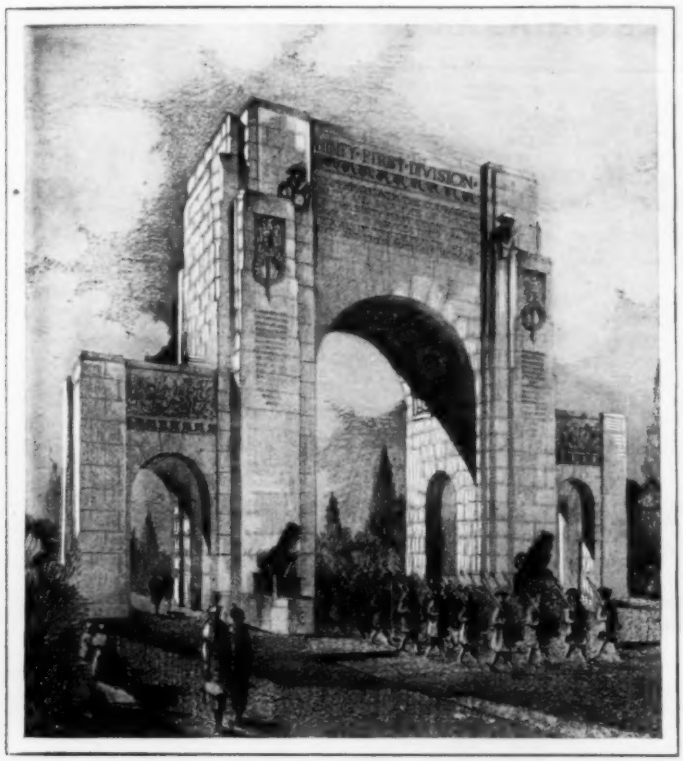
For the photographer, meter readers, mechanics and others, a small electric light is held in the mouth and the switch pressed with the teeth. Both hands are left free for work, and the illumination is directed just where it is needed. The light is safely insulated, weighs but little and does not injure the eyes. The battery is carried in a pocket.

SANDS OF AMERICA'S SAHARA BRIDGED BY CONCRETE



Famous Plank Road across the California Desert Which Is Being Replaced by Permanent Highway Built on a High Level

To Resist the Drifting Sand, It Was Necessary to Raise the Roadbed above the Desert and Soak the Sides with Oil to Anchor the Sand; Below, the Start of the New Highway



In Honor of the Heroes of the "Wild West" Division, Stone Arch over Camp Lewis Highway near Seattle, Washington

STONE ARCH SIXTY FEET HIGH HONORS WAR HEROES

The heroic figures of two doughboys flank the inscription on a massive stone arch erected over the Camp Lewis highway, near Seattle, Wash., in honor of the men of the ninety-first or "Wild West" division. The monument is sixty feet high and cost approximately $100,000. Two smaller spans at the sides emphasize the proportions of the central arch which bears a dedicatory inscription.

MUSIC FROM PLANE IS HEARD WITHOUT RECEIVERS

Enter the "singing and talking airplane." Successful sending of music and speech from an airplane at altitudes ranging from 1,000 feet to a mile with such volume that the sounds could be plainly heard by persons on the ground without the help of radio receivers or other apparatus was a feature of a recent air meet in Philadelphia. The plane was equipped with powerful amplifying instruments so adjusted that they would not be damaged when the ship took off or landed. Engineers believe this demonstration opens up a new field of usefulness for the airplane. With such equipment, observations and other important data could be relayed directly to listeners on the ground. It is pointed out that the day of an "aerial town crier" may be at hand. He will be able to announce news bulletins and other information while moving swiftly overhead.

COMBINED SANDER JOINTER AND EDGER

A novel type of sander, recently placed on the market, combines three tools in one machine, yet has but one moving part, the armature of the motor. The novelty lies in the fact that the armature is also the sand drum, the sand paper being wrapped around it. The machine can be operated as a hand sander, working like an ordinary plane,

Novel Sander Operated Either by Hand, or Reversed, in Special Mount, to Become Table Type

and turned upside down in a special rest, it becomes a table sander. It is equally useful for edging casings and similar work.

SALTNESS OF SEA IS TESTED TO TRACE ICEBERGS

How salty is the ocean? To members of the ice patrol, the question is not an idle one, for its answer may give them a clue as to the movements of ocean currents and hence the presence of bergs that may drift down into the shipping paths, menacing life and property. Just recently, an instrument has been devised for making rapid and accurate measurements of the salt content of samples of sea water on ship board. It operates on the principle that the resistance in an electrical circuit varies with the salt content of the water. By means of current supplied by a microphone hummer, and a set of head telephones with the instrument, the investigator is able to detect the difference in resistance offered by samples of water placed in the tester. Two ice-patrol cutters, the "Modoc" and the "Tampa," have been equipped with these instruments and 622 tests were made on board the latter vessel during the season just past. The method has proved much more rapid and accurate than the chemical process of treating the water with silver nitrate.

AUTO AWNING KEEPS OUT SUN AND DIVERTS RAIN

An automobile awning that fits in the top of the door and opens with it has proved a valuable accessory, particularly in the southern states. The awning projects a few inches from the side of the car, and hangs low enough to afford shade without obstructing the view. The metal frame is strongly made, to prevent rattles or flapping, even if the car is running at high speed.

Automobile Awning in Place, Showing How It Provides Shade from the Sun for the Passengers

SUITCASE MOUNTED ON WHEELS TO SIMPLIFY CARRYING

A folding wheeled carrier, opened or closed at a touch, has been devised for handling luggage more easily.

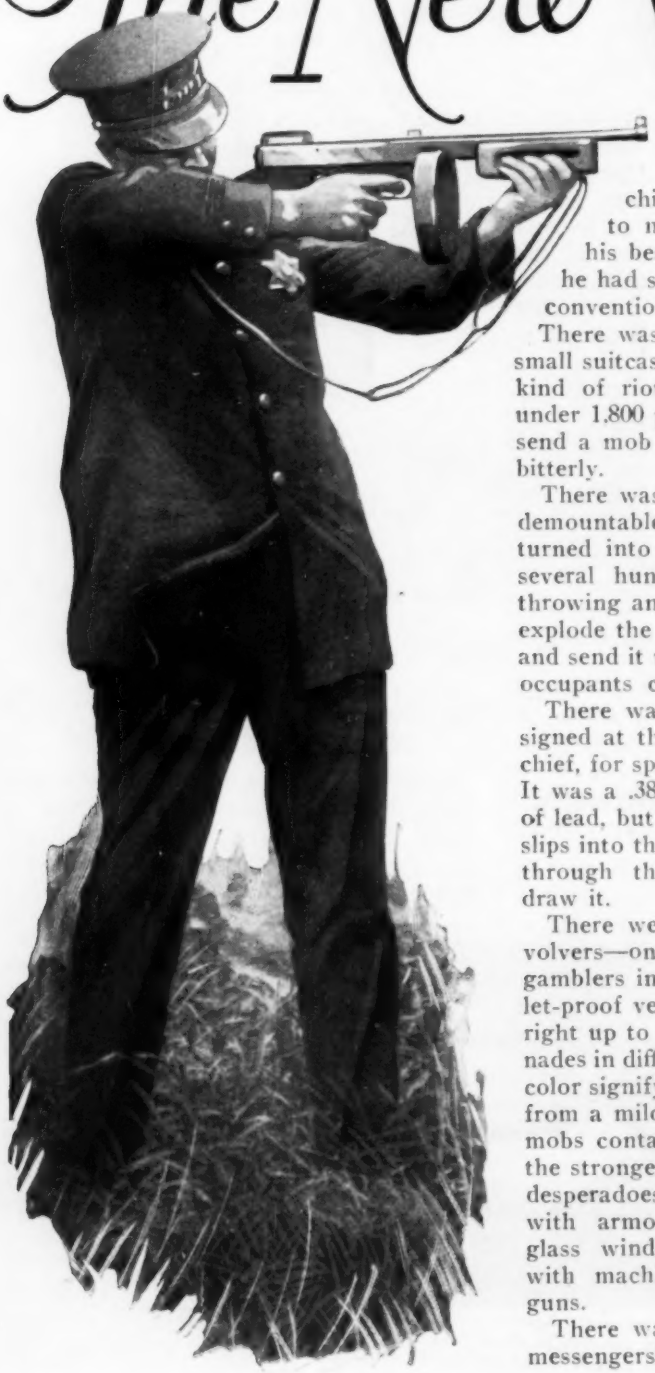
Suitcase Rolls along Easily on Wheeled Carrier Which Folds Up When Not in Use

When shut, only the small wheels project and the standard may be adjusted to various heights to suit tall or short users.

CHINESE COIN MONEY FOR DEAD TO BURN AS OFFERINGS

How a religious belief affects the economic life of a people is illustrated in China, where it is thought that dead persons need money as much as the living do. Hence, the manufacture of a special kind of coin, which is burned as an offering to the spirits, has become a large business. In one province, it amounted to $15,000,000 last year. The money is of tin-coated paper, fashioned in the form of a small shoe, and is hollow so that it will burn easily. Sometimes thousands of them are burned at once.

The New War



THE old-fashioned policeman, who relied chiefly on a locust night stick to maintain peace and order on his beat, would have been dazed if he had seen the exhibits at the recent convention of American police chiefs.

There was an affair that looked like a small suitcase, but turned out to be a new kind of riot gun, loaded with tear gas under 1,800 pounds' pressure, sufficient to send a mob of 2,000 men home, weeping bitterly.

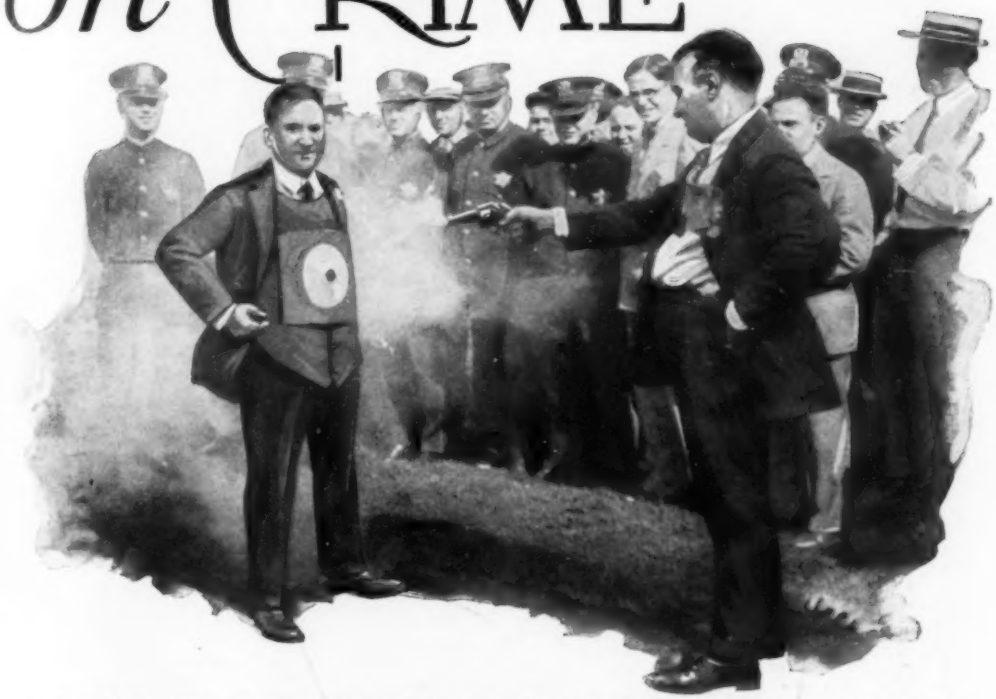
There was a light machine gun with a demountable stock, so that it could be turned into a revolver, capable of firing several hundred shots in a minute, or throwing an incendiary bullet that would explode the gasoline tank of a bandit car and send it up in flames almost before the occupants could tumble out.

There was a new model revolver, designed at the request of Chicago's police chief, for special use of plain-clothes men. It was a .38-caliber gun, firing 200 grains of lead, but with a barrel so short that it slips into the coat pocket and can be fired through the coat without stopping to draw it.

There were tear-gas cartridges for revolvers—one of them stopped 150 angry gamblers in a single raid one night—bullet-proof vests that enable a man to walk right up to a spitting revolver; hand grenades in different colors, four of them, each color signifying the contents, which ranges from a mild little sneezing gas for mixed mobs containing women and children, to the strongest of tear gases for barricaded desperadoes. There were motorcycles with armored shields and bullet-proof glass windows, their sidecars equipped with machine guns and sawed-off riot guns.

There was a suitcase handle for bank messengers' bags, harmless so long as the

on CRIME



Police Chief Testing a Bullet-Proof Vest by Firing Point Blank at the Inventor, Who Wears the Vest and a Smile; on Left Page, the Latest Light Machine Gun

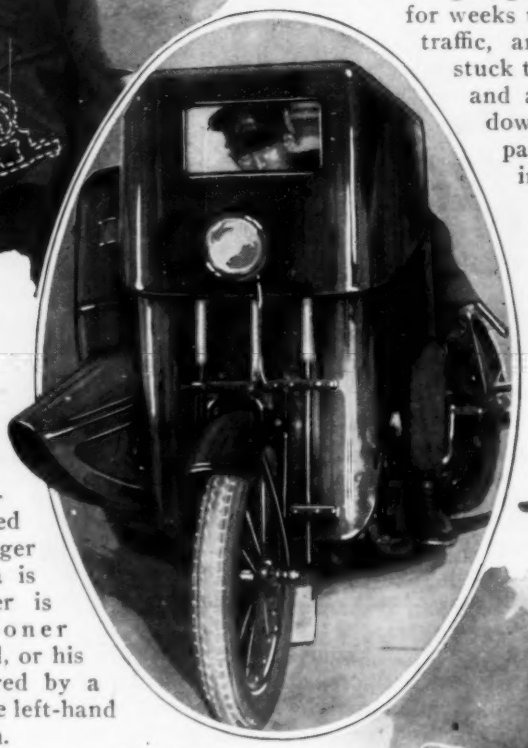
owner holds it, but throwing out clouds of tear gas if any unlucky bandit should force the messenger to drop the bag, and a briefcase for bond messengers that worked the same way.

A pretty little desk ornament, sometimes in the form of a lizard or modeled after a racing greyhound, turned out to be a gas bomb. Connected to a radio C-battery, with wires and switches at each door and window, it is designed to protect your house from burglars, or, placed on the cashier's counter, with a foot button on the floor, it will guard against holdup men.

Two neat little nickelplated devices, which might be mistaken for some new kind of automobile ventilator, were screwed on a car in place of the cowl lights. A button on the floor connects them to a tank of gas and, when pressed, distributes blinding tears among all within a twenty-foot range on either side of the automobile.

There were innocent-looking devices that can be distributed around the factory paymaster's office to cover it with a screen of smoke and gas; gas bombs to be installed in the safe, and even one of those oversized bright-red fountain pens that turned out to be the latest thing in personal weapons, shooting a .38-caliber tear-gas cartridge through a false plug in the end.

In the armament line, there were guns that ranged all the way from the short-barreled revolver for detectives to the old-fashioned frontier model Colt of 1878, the single-action gun that won the west, and is still sold in quantities out there. An expert pistol shot demonstrated the latest things in quick draws and rapid firing. The feature was an upside-down shot. He advised the policemen to carry an extra gun, worn butt forward on the left hip, and to be drawn with the left hand, flipped forward and fired upside down by



Short-Barreled Gun, Top, Can Be Fired through the Pocket; Center, Armored Sidecar with Bullet-Proof Glass, and, Below, Firing a Gun Upside Down with Left Hand

the little finger, or any other finger that happened to fall in the trigger guard. The idea is that, if the officer is holding one prisoner with his right hand, or his right arm is injured by a shot, he still has the left-hand gun to fall back on.

Most policemen carry .38-caliber double-action revolvers. Few put their trust in automatic pistols, and few carry anything smaller than a .38, as the lighter arms lack stopping power. To increase the latter, one of the arms companies exhibited a new type of police ammunition, with a 200-grain lead bullet without any jacket. Steel and copper-jacketed bullets make neat holes for the surgeon to patch up, but don't always put the bandit down for the count. The new ammunition is almost a dum-dum, making an enormous hole. Fired through a telephone book two inches thick, the lead pellet cut out perfect cones, small at the front and two inches or more across where it came out at the back.

The exhibits of devices for fighting crime were many and varied, but even more space was devoted to traffic-control equipment—something the old-fashioned policeman with his locust stick never heard of. There were automatic lights of a dozen varied kinds; metal markers that can be driven into the pavement and will last for years; new kinds of paints for traffic signs, guaranteed to stand up for weeks under constant heavy traffic, and signs that come stuck together like fly paper and are unrolled, slapped down, and left for the passing auto tires to iron into place.

And for the old-fashioned policeman, one exhibitor—and only one—showed the new styles in locust night clubs, but another whose

Above Is a Tear-Gas Cylinder That Fits inside the Bond Messenger's Briefcase, While a Chain and Finger Ring Work the Trigger; the Unlucky Thief Who Grabs the Bag Soon Finds He Can't Hold It Because of the Cloud of Gas

Full-Sized Human Target, with a System of Scoring for Disabling or Fatal Wounds, Is Used by Policemen on Their Revolver-Practice Ranges

An Innocent Little Ornament Conceals a Tear-Gas Cartridge Which Is Fired if Anyone Opens a Door or Window Connected in the Electrical Control System

Suitcase Tear-Gas Riot Gun and a Suitcase Handle Concealing a Gas Bomb Which Is Discharged if Pressure on the Trigger Relaxes

Concealed in the Police Billy Is a Gas Cartridge Which Will Make the Most Hardened Bandit Drop His Revolver

display of billies turned out to be tear-gas bombs attracted more attention. They look exactly like the old-time article, and are fully as capable of raising a large bump as the ordinary type if used as a club, but by pressing a button at the end they will shoot a cloud of gas into a man's eyes.

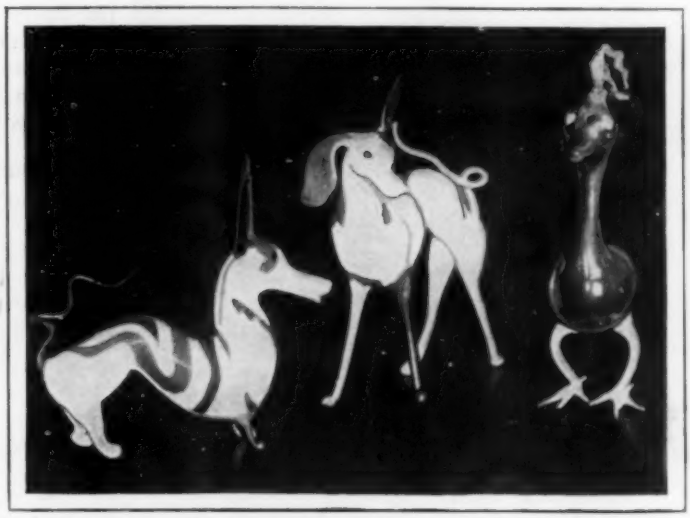
The Latest Thing for Personal Protection Is an Oversize Fountain Pen That Is Really a Gas Gun in Disguise

MACMILLAN FINDS NORSE RUINS NEAR AMERICAN SHORES

Norse legends reciting that vikings settled in America more than 400 years before Columbus discovered the land were further substantiated recently when Donald MacMillan, arctic explorer, returned from Labrador and Greenland with word that ancient ruins on Sculpin island, twenty miles off the coast of Labrador, bore close resemblance to Norse ruins he explored in 1925 in Greenland. No inscriptions were uncovered in the first examination, but the ruins were so like the viking relics in Greenland as to furnish almost positive proof of their similarity of origin. The explorer plans to go back next year to establish a permanent scientific station near the island, and at that time will dig further in search of inscriptions.

SHRUB MAY SOLVE RUBBER PROBLEM

America may become independent of foreign-grown rubber by cultivating the guayule shrub, which is found in northern Mexico and parts of Texas, and is now being grown in California, according to announcement at a recent scientific congress. Improvement of the plant under cultivation and better methods of extracting the rubber have solved the major difficulties, it was said. A rubber-company president, who made the announcement, explained that the billion pounds of rubber consumed each year in the United States required the labor of 600,000 plantation workers, whereas the same amount of guayule rubber could be grown on American farms with about 40,000 workers.



One of the Latest Fads from Berlin, Wooden Dogs and a Duck, Carried by Women instead of Live Pets

WOODEN DOGS ARE CARRIED BY WOMEN OF FASHION

Women of fashion in Germany are carrying wooden dogs and other animals, fantastically carved, instead of live ones. The wood substitutes require no attention and no food, which makes them much easier to keep. An Austrian artist is responsible for the fad, having created most of the designs so far in use.

TRUCK SHOVELED UNDER LOAD REDUCES LABOR COST

Economy and ease of operation are claimed for a two-wheeled truck that has a shovel-like extension which slips under boxes, barrels or other objects. One man with this outfit can lift 500 pounds, it is asserted, often saving the time and expense of a helper. The strong handles afford ample leverage when the load is once adjusted. The truck is designed for operations in close quarters and, after use, it is easily slipped out from under a heavy package.

Shovel Extension on Truck Is Readily Slipped under Load

PHONE SMALLER THAN WATCH FOR MINE-RESCUE WORK

To communicate with the forty-three miners who were trapped in the cave-in of a shaft near Ironwood, Mich., last September, a tiny phone, smaller than a watch, with receiver and transmitter combined was constructed. It was one and three-quarters inches long, three-eighths of an inch wide and one-quarter of an inch thick, and was to have been lowered to the imprisoned men through the drill pipe. A howler was attached instead of a bell.

Worker Making a Test Run on Cable That Hauls Persons to the Top of an 11,000-Foot Peak in Germany

CABLE ROAD UP ALPINE PEAK BUILT FOR TOURISTS

Travelers are hauled to the top of the Zugspitze, an 11,000-foot peak in the German Alps, in cars suspended from a strong steel cable. Twenty persons can ride at once in the passenger cars.

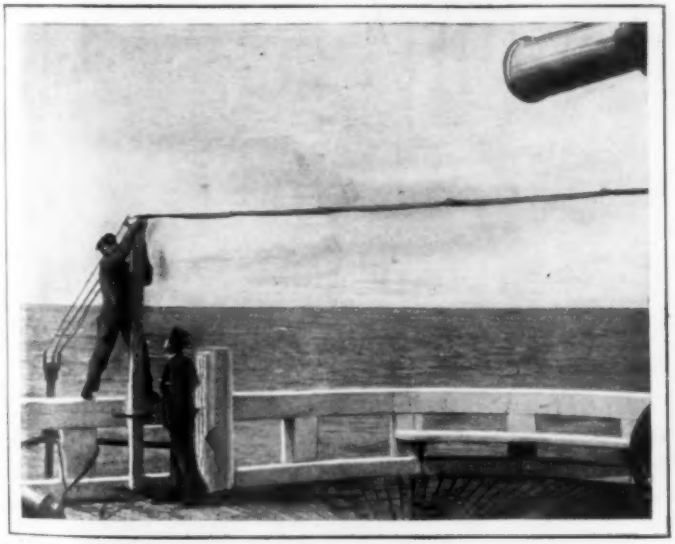
SEARCH FOR FREAK STAMPS YIELDS FORTUNES

When an absent-minded engraver put "post office" instead of "post paid" on a plate to print some stamps for the wife of the governor of Mauritius back in the middle of the last century, he unwittingly laid the basis for several small fortunes. Two of the stamps, still pasted on an envelope, were sold not long ago, for $86,000. The plate was destroyed and only a few stamps made. They had been ordered for invitations to a ball given by the governor's wife. Stamps were then an innovation. Hardly a year passes without some country blundering in one of its issues. The resulting "freaks" are eagerly sought and prized by collectors throughout the world. Shortly after the air mail was started in the United States, a young man purchased 100 twenty-four cent stamps and received a thrill when he looked at the sheet, for the aeroplane on the design was printed upside down. He went back to the window for another 100. The clerk explained the mistake and asked to have the first sheet back in return for others, but the young man refused. He took it to a stamp expert and received $10,000. It is now in the collection of Col. E. H. R. Green, son of the late Hetty Green, and is valued at $20,000. The Columbian exposition in Chicago yielded another odd mistake. On one issue of special stamps made for the occasion, Columbus, smooth-shaven, was seen sighting land and on the other, actually landing but wearing a full beard. Another highly prized freak stamp was issued from the island of St. Kitts in the British West Indies. It shows Columbus using a telescope, an instrument that did not appear until many years after the great explorer. Early "provisional" stamps issued by individual post offices before the federal government had authorized stamps are also highly valued. One from Boscawen, N. H., brought $12,000 recently. The same price was paid for a provisional stamp

issued by Alexandria, Va., and one, dated 1846, from Lockport, N. Y., brought $10,000. Fortunes in stamps are sometimes found on letters that have accumulated in rubbish piles. A stamp company found $15,000 worth in two carloads of waste paper and $75,000 worth was found when an old bank moved into new quarters.

SILENT RADIO REPLACES FOG GUN

Booming of the fog guns is less frequently heard around the harbor of Calais, France, for many ships are now piloted through mists with the aid of radio signals broadcast on such high frequency that they are inaudible to the human ear. A special sending apparatus transmits the impulses which are picked up on receiving sets on the vessels. By means of the direction and volume of the sound, as registered, the navigators can follow a safe course.



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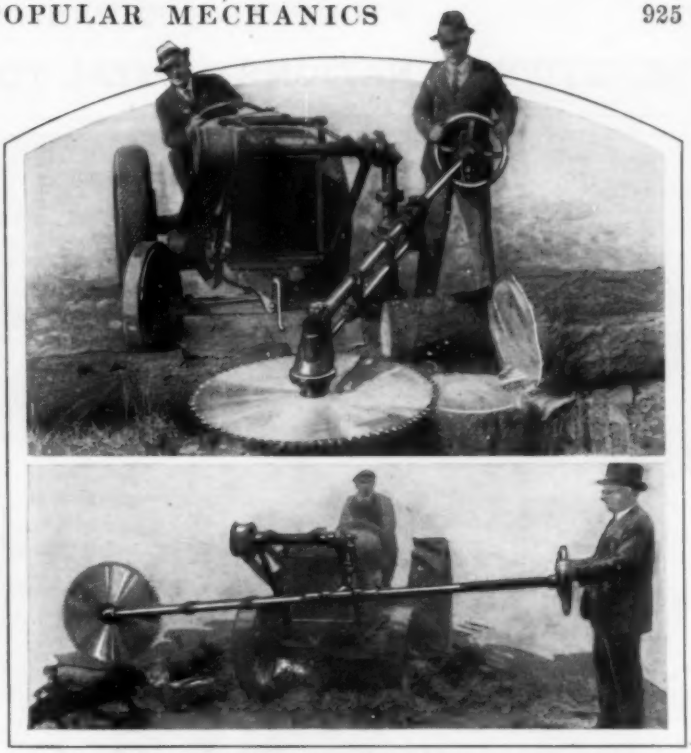
Rigging Aerial under Fog-Signal Transmitter at Upper Right



Tractor Sawmill in Operation, to Show How Easily It Can Be Adjusted to Different Cutting Tasks

SAW ATTACHMENT FOR TRACTOR CUTS AT ANY ANGLE

Reversing the usual method, the sawmill can now be taken to the tree in a rigging for the farm tractor. It can be attached in a few minutes, the makers assert, folds close to the machine, when passing through brush, and can be swung about to cut at various angles, as may be required to suit different jobs. The outfit is especially adapted to clearing land, sawing cordwood, logs or stumps, and auxiliary attachments are being developed for drilling wood or post holes and for cutting threads on gas or water pipe. According to reports, the rig has actually felled and sawed up to twenty cords of oak in one day.

BEAUTIFYING NATION'S CAPITAL TO COST MILLIONS

Above Is a View of the Long Rows of Stately Government Buildings That Eventually Will Line the Route from the Washington Monument to the Distant Capitol When the Plan-Commission Program for the Beautifying of Washington Is Completed; at the Left Is the Present Capitol Building and, Below, as It Will Appear When Completed by the Building of the Central Wing

U. S. PLANS TO COMPLETE NATION'S CAPITAL

Plans for the completion of the capitol building at Washington, in accordance with the design of Thomas U. Walter, prior to the Civil war, will be presented to congress this winter as the result of the appropriation of $165,000,000 last session for public buildings in the capital, and for post offices and other structures in other cities. The plans call for removal of the old east portico and the substitution of a central wing to extend out in line with the senate and house wings, and for the renovation of the rotunda to the original design. The central portion was fostered by Washington, but was not completed until 1830. The two wings, housing the house and senate, were begun in 1851 and completed in 1859, and since that time successive congresses have turned a deaf ear to appeals for funds to complete the building. The program authorized by the last congress includes permanent buildings for the departments of commerce, justice, labor, state and agriculture, a monumental home for the supreme court, and buildings for the internal-revenue department, liberty-loan annex, additions to the government printing office, etc. Practically all the new buildings will be in the Mall area, lining the long vista from the Washington monument to Capitol hill.

MUFF AND HANDBAG COMBINED LATEST PARIS FASHION

Muffs have come into fashion again in Paris in a serviceable form of combination hand warmer and bag, doing away with an extra article of luggage. It is made of black velvet with a silk lining, and space sufficient to hold toilet accessories and other things for an overnight trip is provided on the inside. The contents are securely held against falling out by accident.

© Herbert Photos
Bag Open, Showing Pocket, and Carried as Muff

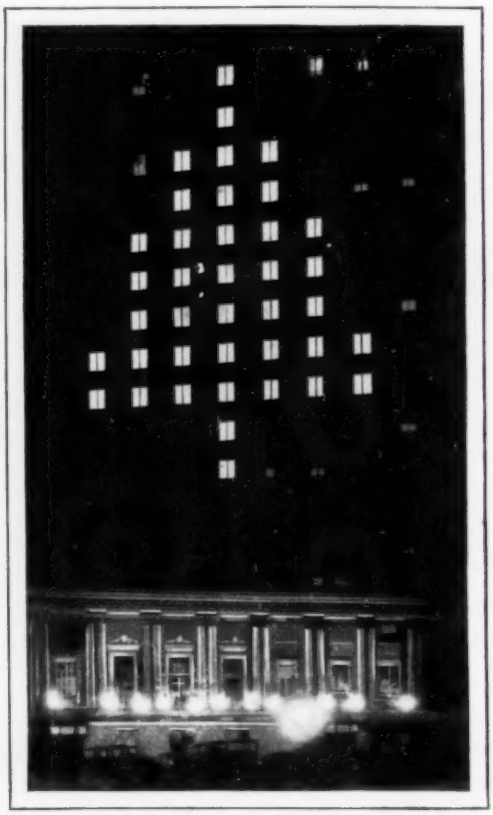
© Herbert Photos
How a Painter Solved the Hot-Weather Problem; Small Fan Attached to Support Kept Face Cool

PAINTER WEARS ELECTRIC FAN FOR COMFORT AT WORK

By plugging an electric fan to the house-lighting circuit and rigging it to a support on his back, a painter avoided discomfort on a severely hot day. Wiring and attachment were arranged so as not to interfere with the worker's movements.

STEEL PURIFIED BY SHAKING WHILE IN MOLTEN STATE

By subjecting molten steel to about 100 jolts a minute, a German metallurgist is reported to have found a way to liberate most of the gases and sulphur from the melt which often cause bubbles and other imperfections in the finished product. The furnace itself is shaken and the effect is said to be similar to that which occurs when a bottle of ginger ale is bounced or jolted to help remove the gas. The steel made by the process is reported to be so pure that it is well adapted to the manufacture of thin castings.



Christmas-Tree Design of Lighted Windows in Big Office Building; Green Shades Heightened Effect

PATTERN OF LIGHTED WINDOWS FOR HOLIDAY DISPLAY

Outlined in glowing green on the side of a large hotel in the east, the figure of a Christmas tree presented a striking holiday appearance at night time. The effect was obtained by shading the windows with green crepe paper and lighting only those rooms arranged to form the shape of the tree. Lamps of increased brilliance were employed to augment the glow.

HEAD, NOT BAD EYES, TO BLAME FOR MOST AUTO ACCIDENTS

Defective eyesight is less to blame for auto accidents than deficient mentality, in the opinion of Dr. Harold D. Judd, of Detroit, Mich., who recently made an analysis of 100 motor mishaps. He concluded that a man with but fifty-per-cent visual efficiency and a nearly 100-per-cent mentality would make a more careful driver than one with perfect eyes and poor judgment. Observation also showed that a combination of good eyes and full intelligence often makes a man more careless than the one who knows his eyesight is not good, but who is normal mentally. To make his study, Dr. Judd devised a way of testing the vision and alertness of the drivers at the same time. The subjects were seated before a screen and instructed to tell what they saw and what action they would take as soon as they were certain of the sign being projected on the curtain. A slide with the word "Stop" was first shown. The letters were too small to be distinguished at the beginning, but were gradually increased in size until the subject could identify them. The quickness of the response was considered a measure of eyesight efficiency and alertness as well. The use of the slide was based on the theory that objects are really recognized by their form long before they reach the size at which they are actually distinguished.

ROPE TIED IN SAILORS' KNOTS WOVEN INTO BASKET

The decorative possibilities of useful knots seamen employ were suggested in a rope basket fashioned by a sailor. The cords were twisted and tied into a sturdy framework of fancy pattern and the basket shaped for holding flowerpots or for other decorative purposes.

Basket for Holding Flowerpot Fashioned of Rope Tied in Sailors' Knots of Various Kinds

Sensitive Flame at Left and, Right, Microphone That Transmitted Voice to Extinguish the Blaze, Which Was Twelve Miles from the Broadcasting Station

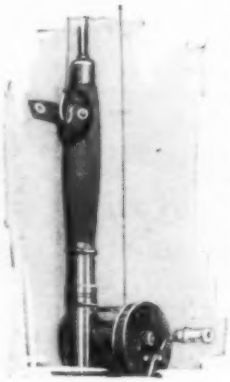
RADIO VOICE PUTS OUT FLAME TWELVE MILES AWAY

Radio reproduction of a high-pitched male voice extinguished a sensitive flame about twelve miles from the broadcasting station during a test from KGO recently. The experiment was witnessed by a number of scientists and students. A shrill note was sounded by a man whose voice resembles that of a bird. As the vibrations were reproduced at the receiving end, they caused the flame to flicker and go out. This effect of a strong, high-pitched voice on fire has been known for a number of years, but is said never before to have been demonstrated by radio.

LIGHTNING STRIKES ROAD

Instances of lightning striking concrete roads and traveling along the reinforcing have aroused the interest of engineers and inspired the question as to whether highways of this sort should not be "reinforced" against bolts as well as against cracking and load. Not long ago, a road in Florida was struck, the lightning splitting and going about 720 feet in each direction through the reinforcing before it entered the ground. In searching for the path of least resistance, the current jumped across the pavement often, generally at the joints. In arcking across the interrupted mesh, it caused enough heat to break out pieces of concrete about a square foot in area. Other instances of lightning's effect on concrete roads are on record. A bridge pavement and railing were destroyed during one storm and a road slab in another.

HOOK HOLDER ON FISHING ROD KEEPS LINE FROM BRUSH



Fastened by means of a snap similar to that on gloves, a clasp attached to the fishing-rod handle keeps the hook and line from becoming entangled in the brush and also prevents injury to the hands. It can be adjusted to any convenient position and protects the hook from damage.

SHOES FOR WALKING ON WATER FITTED WITH PADDLES

Operating the Paddle Foot Boats; Blades Are Moved Back and Forth by Levers

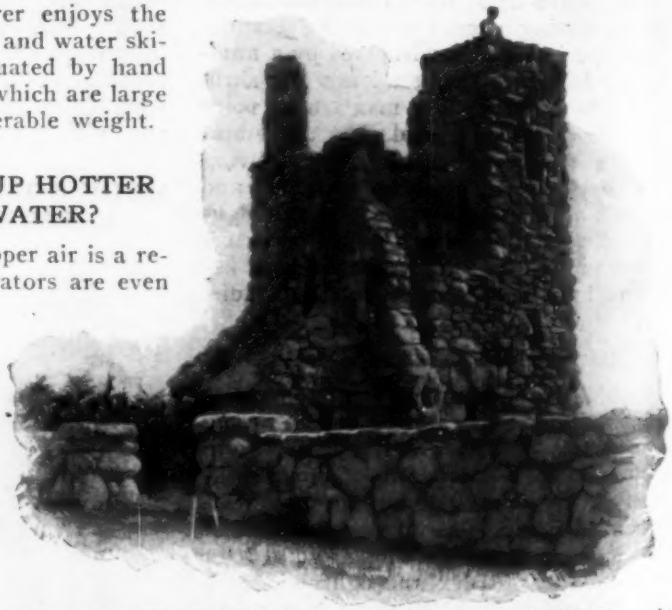
By means of a rowing apparatus attached to water shoes, a German inventor has devised, a fair rate of speed can be attained on smooth lakes and streams, it is reported, and the wearer enjoys the combined thrills of boating and water skiing. The paddles are actuated by hand levers rigged to the floats, which are large enough to support considerable weight.

AIR THIRTY MILES UP HOTTER THAN BOILING WATER?

Like the deep sea, the upper air is a region of mystery. Investigators are even divided on the question as to whether it is hot or cold. Some believe that it exceeds 220 degrees Fahrenheit, others hold that it reaches a temperature as low as seventy-five degrees below zero. The problem was studied with new interest recently following a series of sound tests in France. Several tons of explosives were set off at a place about midway between Paris and the Pyrenees. Observers, stationed at various points, were notified as to the exact time the explosions were to take place, and then made notes as to the instant the sound arrived. Wind conditions, temperature and other factors were taken into account, and the records, several hundred of them, were compared. From these data, various deductions were made as to the state of the upper air. Prof. Charles Maurain, a Paris scholar, concluded that the air has a uniform temperature up to over thirty miles. J. F. Whipple, a British weather expert, decided that the results indicated that the temperature begins to rise at about twenty miles and, at thirty, may reach 220 degrees Fahrenheit. While the cold theory seems to be supported by the findings of aviators, scientific opinion elsewhere, so far as expressed, is divided on the subject.

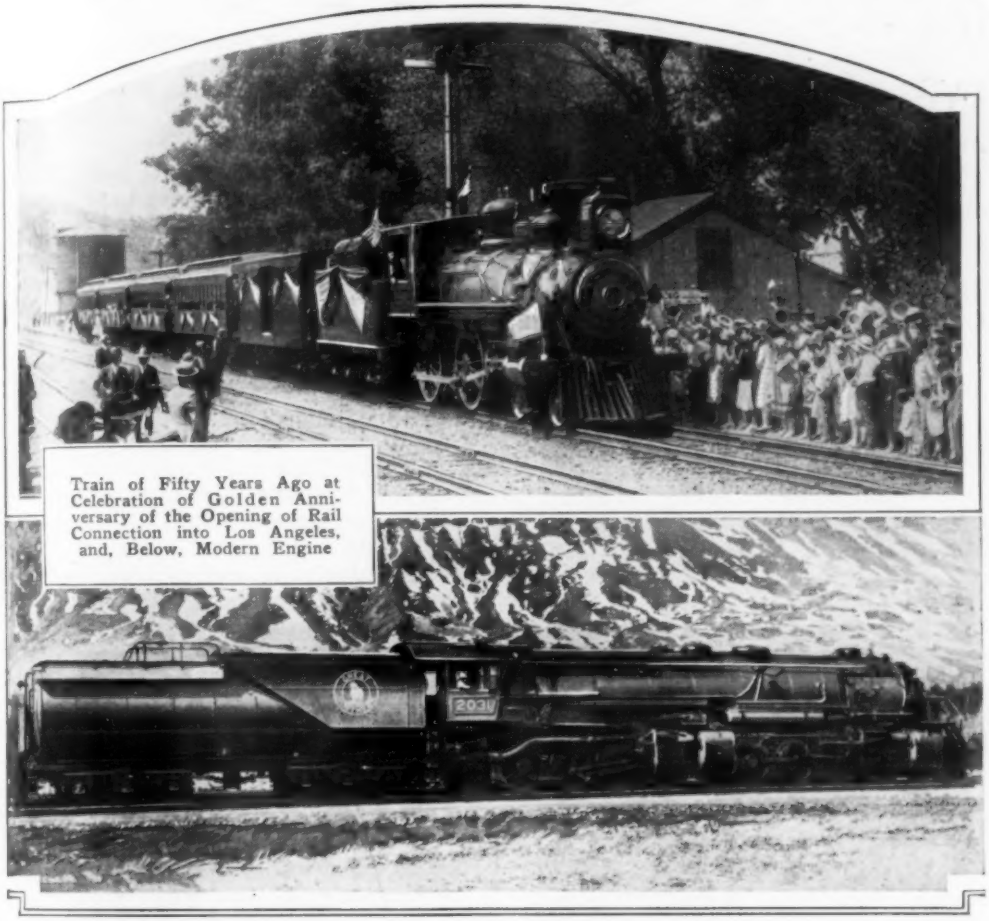
PLAYHOUSE IN FORM OF CASTLE BUILT OF COBBLESTONES

Constructed of stone, a playhouse built by Robinson Jeffers, the California writer, for his two sons, has a tower like that of a castle. It is roomy and cool, and harmonizes with the rugged lines of the seashore near which it is located.



Tiny Stone Playhouse Castle Built by California Writer for His Sons; the Tower Serves as Observatory and Contains Several Rooms

GOLDEN SPIKE DRIVEN TO MARK RAIL ANNIVERSARY



Train of Fifty Years Ago at Celebration of Golden Anniversary of the Opening of Rail Connection into Los Angeles, and, Below, Modern Engine

The golden anniversary of the arrival of railroad transportation in Los Angeles, recently was celebrated at the wayside station of Lang, forty-five miles north of the film capital, when the original train that made the first run fifty years ago, carried pioneers and city officials to the scene. A golden spike was driven on the spot where the rails were joined half a century ago. A de-luxe special of latest-model Pullmans, drawn by one of the biggest engines in the west, brought Mayor Rolph and a party from San Francisco to meet the old-time train from the south at Lang. The difference in railroading at that time and now was strikingly demonstrated by the contrast between the first locomotive that entered Los Angeles and the new-type freight giant, which otherwise is used by the Great Northern only to pull mile-long ore trains over the mountains.

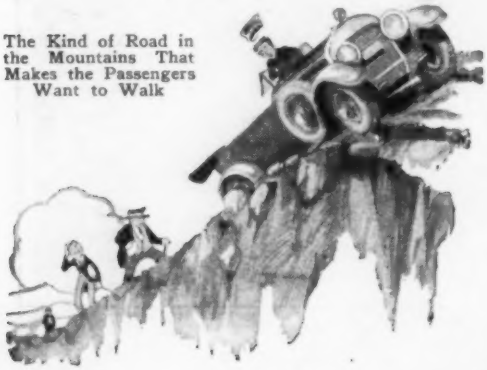
TWO-PIECE RIM ON AUTO WHEEL SIMPLIFIES CHANGING TIRES

Held together by studs in the face of the flange, a two-piece auto-wheel rim makes it easier to change tires, as neither lugs nor the usual tools are needed. When mounted, the flange lies flat against the felloe, with the result that exact alinement of the tire and rim is obtained.

How To Climb Mountains

By JOHN EDWIN HOAG

DRIVING an automobile over ordinary highways and city streets is one thing, but driving in mountainous country is quite another. A person may be the most



The Kind of Road in the Mountains That Makes the Passengers Want to Walk

proficient of drivers under average road conditions, but literally a babe in the woods when he finds himself on a steep and narrow trail that goes wiggling up and over some titanic range of precipitous mountains.

The motor tourist from the level country meeting the hills for the first time is usually terrified. Some lose their heads completely. Others become violently ill from nerve strain. Mountain sickness, a near relative of seasickness, afflicts persons who are sensitive to changes of altitude. Automobiles become weak and languid trying to digest the rarefied atmosphere of high elevations. Radiators boil like teakettles where water boils at such low temperatures that food cannot be cooked in it.

People lacking previous experience in mountain driving make many mistakes that knowledge would enable them to avoid. Disastrous accidents are often the result. The purpose of this article, therefore, is an attempt to convey information that should be of value to the motor tourist inexperienced in mountain driving. No driver who has not had sufficient experience to handle his car by purely mechanical movements of the hands and feet has any business venturing onto mountain roads. The motorist who goes into such country for the first time has a multitude of things to consider which do not play such an important part in ordinary highway driving. The first thing to be looked after is the car itself. Some automobiles are good mountain cars and others are not. A powerful motor, of course, is always desirable. The power of the motor, however, is not so important as the size and wheelbase of the vehicle, and the weight of the load that the motor is called upon to pull over steep grades.

Any monstrously big automobile with a long wheelbase is a menace to life on steep and tortuous mountain roads. No matter how powerful it is, it cannot be handled on the turns satisfactorily and safely. It is clumsy and awkward to drive on roads that may be only a foot wider than the car itself—and particularly, when that foot of spare road is at the edge of a 2,000-foot cliff. And, just as the medium-sized car is better than the large one, the smallest of automobiles, if slightly altered for mountain use, is still better.

The Ford that is to be subjected to such use should have a variable gear transmission, adding two more speeds to those supplied by the manufacturers. It should be

Save Your Brake Bands and Put the Engine in Low, Then This Will Not Happen

fitted with a circulating pump to increase its engine-cooling efficiency, and should have rear-wheel brakes that will stand the most abnormal demands of service with-

Safely In Your Car

out overheating or burning out. These accessories can be obtained at a cost of about $100, and they are worth many times the price.

It goes without saying that the conditions of mountain service make it imperative that a motor car should be put in good mechanical condition before it is taken into the hills. No single part of the car should have more careful attention than the brakes. Brakes may mean life or death. If the brake bands show any appreciable wear, they should be replaced. The valves in the motor should be ground in, and the motor itself should receive every attention that will give it the last possible ounce of power.

Brakes are important for ordinary traffic driving, but a thousand times more important in the mountains. Yet the driver who attempts to come down off a mountain by pushing out the clutch and checking speed with the brakes, is literally playing hookey from the graveyard. No automobile brake that was ever built will stand such use for a single hour without going out of business entirely. The engine that drives the car up the hill is the brake to use for getting down. You can't hurt the engine by properly using it to check the speed of descending a slope. Come down in second gear or, if the hill appears to be particularly steep and dangerous, get into low before you start down. If you try to shift into low after the car has developed excessive speed in second, you may find yourself coasting down the hill in neutral.

No car can gain dangerous speed on any road grade when coming down in low gear with a closed throttle. If, however, the grade is so steep that too much speed is gained in either second or low gear, the foot brake should be used occasionally without releasing the clutch. In many mountain states road signs now tell the driver when the low gear should be used. But, if no such sign is seen, he must rely upon his own judgment. In these states, the motor laws usually stipulate that gears must be kept constantly in mesh while traveling mountain roads, except when it is necessary to shift from one gear to

The Pechecio-Pass Road in Lower California

This Grade on Mt. Wilson, Rising One Mile in Nine, Is a One-Way Road; on Mountain Roads That Are Wide Enough, the Up-Bound Car Always Has the Right of Way and Takes the Inside

another. Inexperienced drivers frequently make the mistake of switching off the ignition when coming down a long steep grade in second or low gear. This is bad for the motor, because fuel that is not exploded is being constantly pumped into the cylinders. It cuts the oil off the cylinder walls and may do serious damage. A much better method is to leave the ignition on, closing the throttle as far as it will go.

In going up a grade and around innumerable blind hairpin turns, the driver must use his judgment to decide what gear he is going to need to make the grade. It is better to start up the hill in low gear than to have to shift from second to low in the middle of the grade with the attending danger of stalling the engine, and possibly backing down out of control. When a car is unintentionally stalled in the middle of a steep grade, someone should be assigned to the task of blocking the wheels before the driver attempts to start the car or leave his seat. Stones are usually available for this purpose. If stones are used for wheel blocks, it is only courtesy to other travelers of the road that they be removed before you go on.

The courts of all the mountainous states have ruled that responsibility for a collision between two vehicles on a mountain road always rests upon the driver who is coming down the grade. This is logical and as it should be, for it is almost impossible for the driver coming up to cause an accident to any vehicle other than his own. The fellow who is roaring up the grade in low gear with his foot hard and heavy on the gas can bring his car to an almost instant stop. He has but to take his foot off the accelerator—and the law of gravity stops him. On mountain grades that are wide enough to permit vehicles going in opposite directions to pass each other, it is customary, in tight places, for the descending machine to take the outside of the road. This is precisely the reverse of the American rule by which all traffic keeps to the right-hand side of the road. In the mountains one goes to the right or left according to the circumstances. If there is any question of doubt or misunderstanding of signals between drivers of machines approaching each other from opposite directions, it is the

Ordinary Traffic Rules Do Not Always Apply in the Mountains; the Descending Car on a Steep Grade Is Supposed to Take the Outside, Whether It Is Right or Left

duty of the driver of the descending machine to come to a stop. The up-bound car always has the right of way.

Next to good brakes, an electric horn, or some sort of device that will make the greatest possible noise, is the best kind of insurance against accidents. Horns for mountain use are valued according to the volume of racket they can make. A horn that would be loud enough in the city could not be heard around a hairpin curve in the mountains where motor cars roar

A Hinged Sprag Drags on the Road, But Digs In When the Car Stops and Holds It

up the grades with wide-open throttles, and usually with mufflers, and even exhaust pipes, removed. Safety in the mountains is thus reckoned largely in terms of noise. The more noise you can make the safer you are.

The volume of noise is also important because many autoists go temporarily deaf from sudden changes of altitude. Deafness is caused by the fluctuation of atmospheric pressure at varying altitudes. When such deafness occurs, it can be relieved instantly by the mountain driver who knows the trick. Hold the nostrils shut with the fingers, and then blow hard. You'll hear a noise inside your head like an exploding firecracker, and—presto!—you've got your normal hearing back.

Very few persons besides those suffering from heart disease, high blood pressure, or other similar infirmity, suffer any inconvenience other than temporary deafness from altitudes below 5,000 feet. Above 5,000 feet, however, and on some western roads where altitudes of from 10,000 to 14,000 feet are encountered, the conditions met in mountain motoring are almost identical with those experienced by aviators. In other words, the motorist, to withstand these very high elevations, must be of sound physique. If one is contemplating a trip into high altitudes, especially if he expects to drive, it is advisable to call on the family physician for an examination before starting. If the doctor says your heart action or blood pressure is abnormal in some way, there is only one recourse. That is not to go.

Altitude also affects the automobile motor somewhat as it does the human body. Few cars begin "to feel it" below

Even in Mexico the Dangerous Curves Are Marked; This Sign in Pechecio Pass Says, in Spanish, "Dangerous Curve; Moderate Your Speed"

5,000 feet, but from there on, engines rapidly lose power for each 1,000 feet of altitude gained. A car that would romp up a grade in second gear at 5,000 feet would have to get into low gear to make the same grade at 10,000 feet. Above 10,000 feet many perfectly good automobiles cannot even pull themselves along in high gear on level ground.

In high altitudes motorists will also find the radiators boiling violently for no apparent reason. That is nothing to get excited about. Water boils at 212 degrees at sea level. At an elevation of 10,000 feet it boils at a so much lower temperature that potatoes can be kept in it for a week without ever cooking them to a point where they would be fit to eat. So, if the radiator of your car sizzles and roars like an overheated teakettle, let it boil. It won't hurt anything unless it actually boils dry. To offset this condition of violent boiling at low temperatures it is advisable to refill the radiator frequently.

When you go into the mountains, leave all your speed schedules at home. Too much speed is the cause of almost all mountain-road accidents. Any attempt to make fast time over mountain roads is not only dangerous but utterly futile. The wildest kind of driver cannot hope to gain more than a few minutes over a sane and conservative driver in traveling over a distance of fifty miles. No possible saving of time that might be effected by wild driving in the mountains can offset the risk it involves.

One highly important thing that every motorist in the mountains should know is how to bring his car back under control after he has lost it on a grade. On such roads there are usually just two places for a derelict car to go. One is off the cliff, and the other is into the sidewalls of the grade. Obviously, the wall is the choice, but there's a knack in bringing the car to a stop without upsetting. The inexperienced driver who finds himself heading down a grade through "losing his gears" or brake failure, usually takes a death grip on the steering wheel and hangs on for the inevitable. When this happens to the trained driver, he gently pulls the steering wheel over toward the wall. Fenders and running board gradually begin to scrape and dig in. The car seldom goes more than a few feet before friction overcomes gravity, and the vehicle is brought to a stop with no damage greater than the loss of a little paint.

Of course, when a car goes out of control while ascending a grade, and starts to

back down, the steering wheel is manipulated very gently in the opposite direction from the way it would be moved if the car were going forward. Quick use of the brakes, however, is the best method of checking a car which has begun to back down. Edging into the wall is merely an alternative in case of brake failure.

I have known many mountain drivers who have fitted their automobiles with a heavy metal sprag, as shown in one of the accompanying illustrations. This device, which works like the stiff quills of a woodpecker's tail in keeping him from sliding down the trunk of a tree, is an absolute safeguard against a motor car going out of control and backing down a grade.

When coming down steep grades that are often many miles in length, motorists can save their brakes, and the strain of holding the car in check, by dragging a small tree tied to the rear of the vehicle.

ANNUAL LOSS FROM ACCIDENTS FIVE BILLION DOLLARS

Upward of 12,000,000 accidents occur in the United States every year, according to a survey made by officials of a New York hospital. Of these, between 2,500,000 and 3,000,000 are industrial. The economic loss computed on the basis of a day's wage of $4, if applied at the same ratio to all accidents in the country, would show a loss of nearly $5,000,000,000, not considering destruction of property. One person in every nine meets with a mishap every year, the survey showed, and one out of every ten deaths is due to accidental causes. An average of more than 100,000 persons lose arms, feet or hands as a result of accidents in the space of a year.

Seat Pulled Forward to Aid Passenger in Alighting, and Close View of the Sliding Rack

SLIDING FRONT SEAT FOR AUTO GIVES MORE ROOM

By merely pulling a knob, an adjustable automobile seat can be slid backward or forward allowing ample room for passengers to get in or out and enabling the driver to change position for greater comfort on long trips. It is simple to install and may be tilted up and forward like the usual kind.

Huge Mail Box Built Especially to Receive "Boosting" Letters Written by Residents of Florida Town

TWELVE-FOOT MAIL BOX ADVERTISES TOWN

To hold letters which residents of a Florida city were asked to write to their friends, explaining the advantages of the place, a mail box, twelve feet high, was provided. Even this huge receptacle was not large enough to contain all the messages.

So Small It Can Be Carried in a Handbag, This Pony Saves Shipping Costs

TINY PONY IS TOO SMALL TO WEAR SHOES

So small that it is impossible to shoe it for fear of splitting its hoofs with the nails, a tiny pony owned by a Baltimore man stands only twenty-six inches high, though it is eighteen months old. The animal weighs but fifty-six pounds, which is claimed to make it the world's smallest horse and a rival in size of the extinct five-toed horses whose bones are found in the west. While the pony is not big enough to ride and work, its small size has an advantage when traveling, because it can be carried in an enlarged suitcase.

Forty-eight U. S. radio-compass stations gave bearings to 83,900 ships in 1925.

AIR FROM WELL IS HARNESSED TO AID DIGGERS

Oil-well diggers in a Texas field received a surprise not long ago when they struck a cold current of what at first was believed to be a mysterious gas. Investigation showed that it was air. Adopting the suggestion of one of the workers, the flow was harnessed to the drilling machinery, which had been put out of commission by the failure of the steam supply, and, in a short time, the rigging was working smoothly. Gauges showed a pressure of 120 pounds to the square inch. Ice-machine oil was substituted for the regular steam-engine variety, which would have been unfit for use under the circumstances, and the power plant was found to perform as well under the frigid air as it had done under steam. The current had an initial pressure of about 400 pounds and about ninety-three per cent of it was nitrogen. Pipes through which it was conducted soon became coated with a heavy layer of frost. The flow is still being used to continue the drilling down to the oil level below the depth of 1,100 feet where the air was encountered.

FLEXIBLE PULLER FOR PACKING SAVES TIME AND INJURIES

Removing tightly jammed packing from hot stuffing boxes often takes considerable time and trouble and is likely to result in burned and bruised hands. To simplify this task, a set of flexible pullers has been devised. Each has a corkscrew hook at one end and a convenient handle at the other. The shaft is easily poked into difficult corners of the box and a turn of the grip engages the packing, which can then be dislodged easily and quickly. With this tool there is little likelihood that the worker will hurt his hands.

Japanese Men and Women in Race with Odd Paddle Cars; Steering Wheel Swings Rudder in Front for Guiding, and Power Is Applied to Rear Wheel through Pedals

RACE BETWEEN WATER CYCLES LATEST JAPANESE SPORT

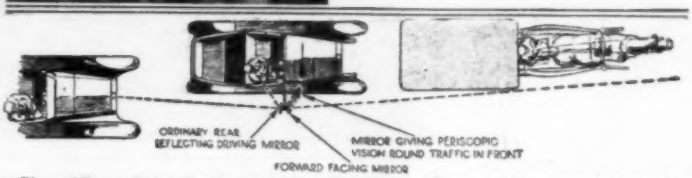
A novelty in aquatic sports has appeared in Japan with the introduction of a foot-propelled paddle boat guided by a wheel resembling the steering apparatus of an automobile. The rider works the gears with pedals. Races between these craft test the skill and strength of the operators.

CHINESE USE ROSES TO FLAVOR TEA, CANDY AND WINE

Great quantities of roses are grown and sold annually in China, not for ornamental purposes but for flavoring. They are used extensively to scent tea leaves; pounded into a pulpy mass, they are added to other ingredients in making candy and are also employed to impart a pleasing taste to homemade wine. Some confectioners use them to scent melon seeds. The rose trade forms a large part of the business of one of the guilds of China. The blossoms are often dried and stored in large receptacles, covered with oil paper, for later use. The drying reduces their weight by about half and is done by applying gentle heat or in sunlight. In some parts of China, roses retail at about $1 for 450 flowers. The dried blossoms command a slightly higher price.

SIDEWALK PERISCOPE ON AUTO SEES AROUND OBSTACLES

Autoists are afforded a view of the road ahead of a car or other obstructions running in front of them by means of a periscope that operates sidewise instead of vertically. It consists of three mirrors so arranged that the driver may actually see around the car ahead to make sure if the highway is clear for an attempt at passing. During a test of the attachment in Paris, a blanket was placed over the windshield and the car was guided through the city safely and without trouble simply by looking at the forward reflecting mirror.



Close View of the Periscope at Side of Automobile, and Diagram Illustrating Vision It Affords

Drawing to Illustrate How House Rests on Tumbler Base and Can Be Tipped by Quake but Righted Again

QUAKE-PROOF BUILDING SWINGS ON FLOATING FOUNDATION

An interesting type of earthquake-proof building has been designed by a German architect for erection in Japan, and other countries that suffer from occasional shocks, and in mining districts where blasting and falling areas of rock and soil often damage houses of ordinary construction. The secret of the German's plan, which has been subjected to a number of tests, is that the building rests upon a curved base that fits into a corresponding depression in the foundation. This bottom is filled with a cheap grade of concrete to give it weight and reduce expense and the entire section functions both as an anchor and a pivot, allowing the building to sway in any direction and protecting the walls from the shock of the quake. To bring the structure back to a level position after it has tipped, water is forced into the trench-like space around the weighted base. The building itself is strongly made of concrete and steel, walls and ceilings also being of steel material, and there is special bracing between them and the foundation.

CHIMES TO ROUSE PASSENGERS ON PULLMANS

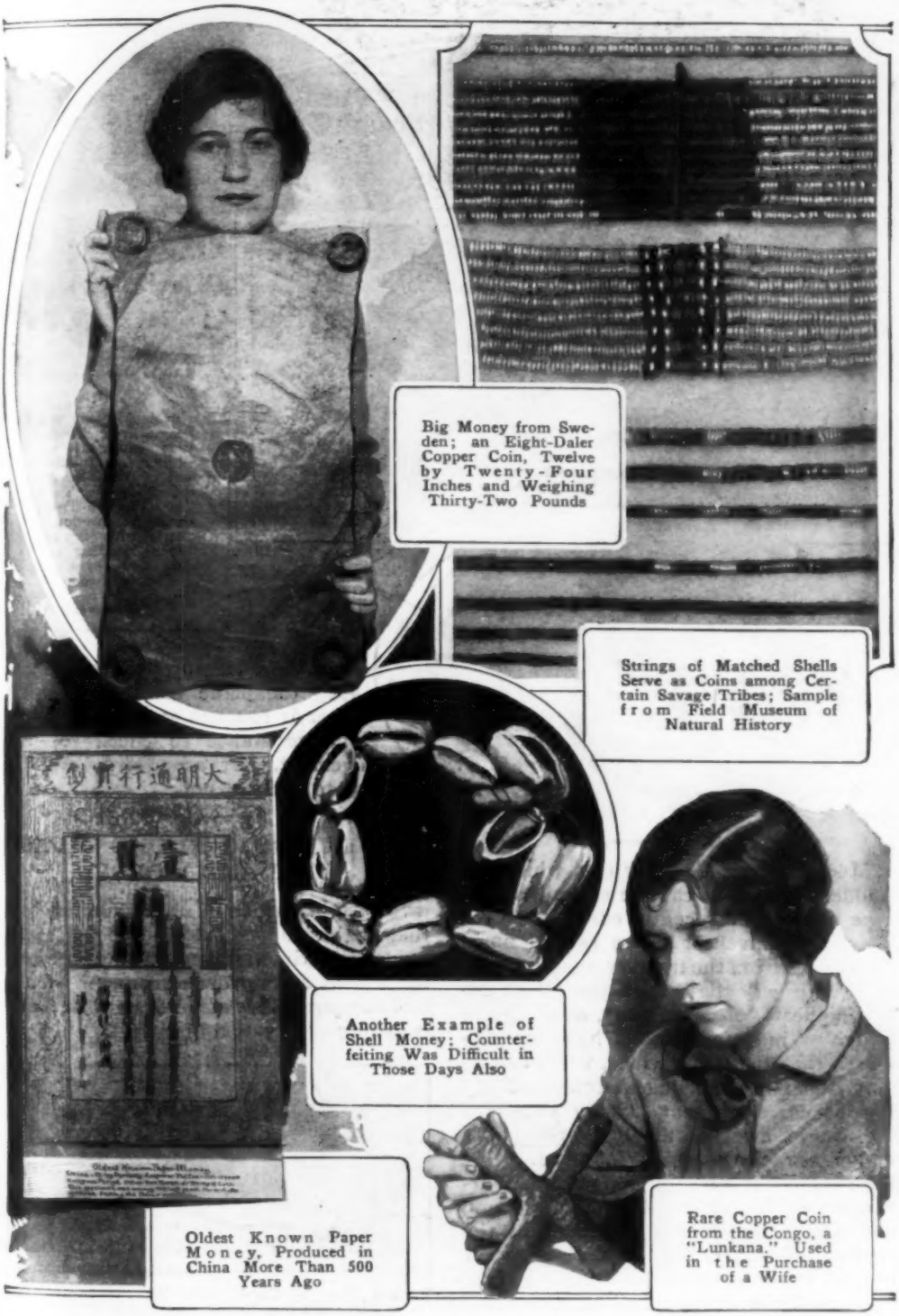
Four-toned chimes will be used to awaken sleeping-car passengers instead of shouts and tugging at the bed clothing, if an experiment on a southern line proves successful. The porter plays the chimes as he passes down the aisle, and the melodious notes, like those of mission bells, are calculated to be as effective as other calls and much more pleasing.

CYLINDER-HEAD LIFTER FITS SPARK-PLUG HOLES

Although it fits any of the three standard sizes of spark-plug holes, a cylinder-head lifter, recently perfected, is sold in only one model. The threads which enable it to be screwed into any of the three-size holes are all on one shaft. The tool has a ratchet device enabling it to be screwed in place in cramped quarters, and when used, it is claimed, protects the gaskets from damage incurred in trying to pry the head up by the use of wedges.

Lifting a Cylinder Head with Two Handles Which Screw into Any-Size Spark-Plug Opening

QUEER THINGS USED AS MONEY CENTURIES AGO



Big Money from Sweden; an Eight-Daler Copper Coin, Twelve by Twenty-Four Inches and Weighing Thirty-Two Pounds

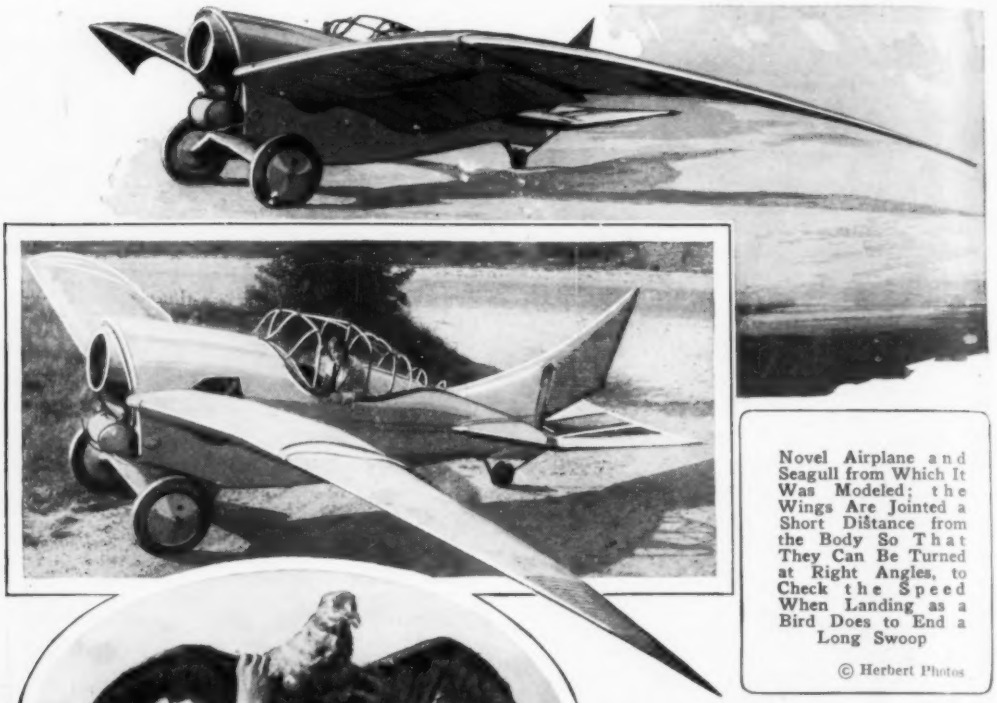
Strings of Matched Shells Serve as Coins among Certain Savage Tribes; Sample from Field Museum of Natural History

Another Example of Shell Money; Counterfeiting Was Difficult in Those Days Also

Oldest Known Paper Money, Produced in China More Than 500 Years Ago

Rare Copper Coin from the Congo, a "Lunkana," Used in the Purchase of a Wife

PLANE BUILT LIKE SEAGULL HAS TURNING WINGS



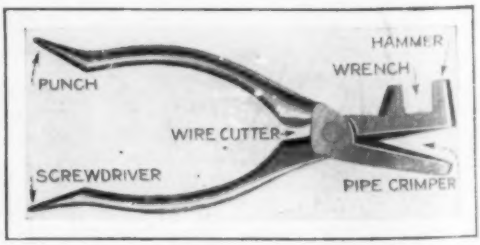
Novel Airplane and Seagull from Which It Was Modeled; the Wings Are Jointed a Short Distance from the Body So That They Can Be Turned at Right Angles, to Check the Speed When Landing as a Bird Does to End a Long Swoop

© Herbert Photos

Modeled from a plaster cast which the builder made of a captive seagull, a new type of airplane recently completed by a New York inventor offers several novel departures from the usual type. The fuselage, with very slight variations, is an exact duplicate, on large scale, of the gull's body. Wind-tunnel tests, however, disclosed that the gull's wings, while admirably designed for flying at comparatively low speeds, were not exactly suited to high-speed airplane flight, so the ship's wings are considerably modified. The most novel feature, however, is an arrangement by which a hydraulic pump and gear, controlled by a lever in the cockpit, can turn the wings from their normal position to one of almost a right angle to the direction of movement. With this the inventor believes he can stop the plane within a few feet after it touches ground, using the wind resistance to check forward movement, just as a bird turns its wings to end a swoop.

SEVEN TOOLS IN ONE SAVES TIME AND WORRY

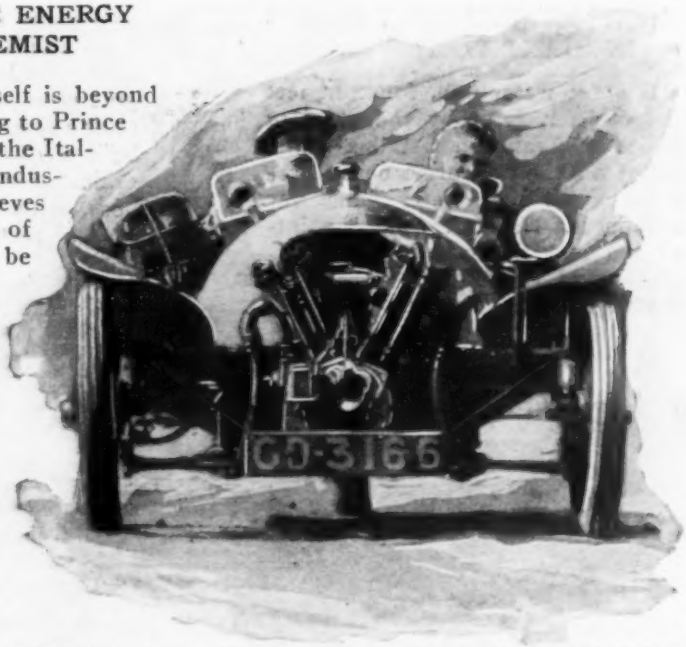
Shaped like a pair of pliers, a handy tool that can be slipped into the pocket, is intended for crimping pipe, cutting wire, and for use as a screwdriver, punch, wrench and hammer. It is made of hard steel and is fashioned to last a lifetime.



Various Uses of Combination Tool Illustrated; Its Shape and Size Permit Carrying in Pocket

USE OF VOLCANIC ENERGY URGED BY CHEMIST

Harnessing Vesuvius itself is beyond actual possibility, according to Prince Ginori-Conti, president of the Italian society of general and industrial chemistry, but he believes that the natural reservoirs of heat lying near by may be utilized, and cites development of this sort that already has been accomplished in other parts of Italy. In the Soffioni district, for instance, where generation of power from the steam springs was a secondary objective, a number of valuable industrial products have been obtained, such as boron and its derivatives, borax, perborate of soda and other boron salts. Carbon dioxide, helium, argon and other gases have been found, he reports, and from the steam spouts of Tuscany, ammonia is separated for the production of carbonate of ammonia. Borax is also obtained, and special plants which depend upon heat and gases from the springs have been erected at Larderello in Tuscany. The steam flow under the earth is being tapped by means of wells drilled to depths ranging from 180 to 750 feet and sixteen inches in diameter. Steam appears in many instances at forty-five or fifty feet. Rotary drills of the latest type are used for the work, and the bore is sunk until skilled engineers decide that no further advantage will be gained. From two to six months were required to drill a well, but the operation is now conducted more rapidly. The prince declared that the geysers in this country may afford a valuable source of industrial power by proper development.

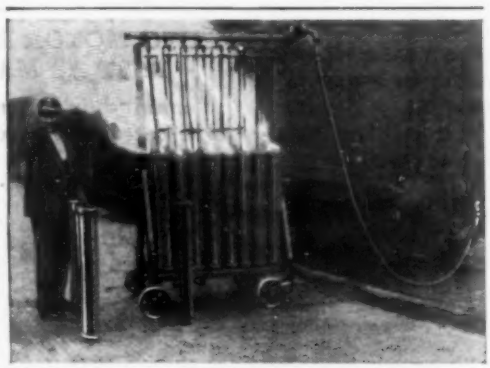


Tricycle Auto Appears in Racing Circles; This Car with Rear Third Wheel Won a Six-Day Event in Scotland

THREE-WHEEL AUTO IS FIRST IN SIX-DAY RACE

Automobiles, built tricycle-fashion with but three wheels, have been used in Germany for taxicab and private service and they now appear in racing circles. A car of this type, with the single wheel at the rear, won a six-day motor trial event in Scotland. Other autos of curious design also took part in the race.

WATER BOTTLES HEAT CARS ON ITALIAN RAILROAD

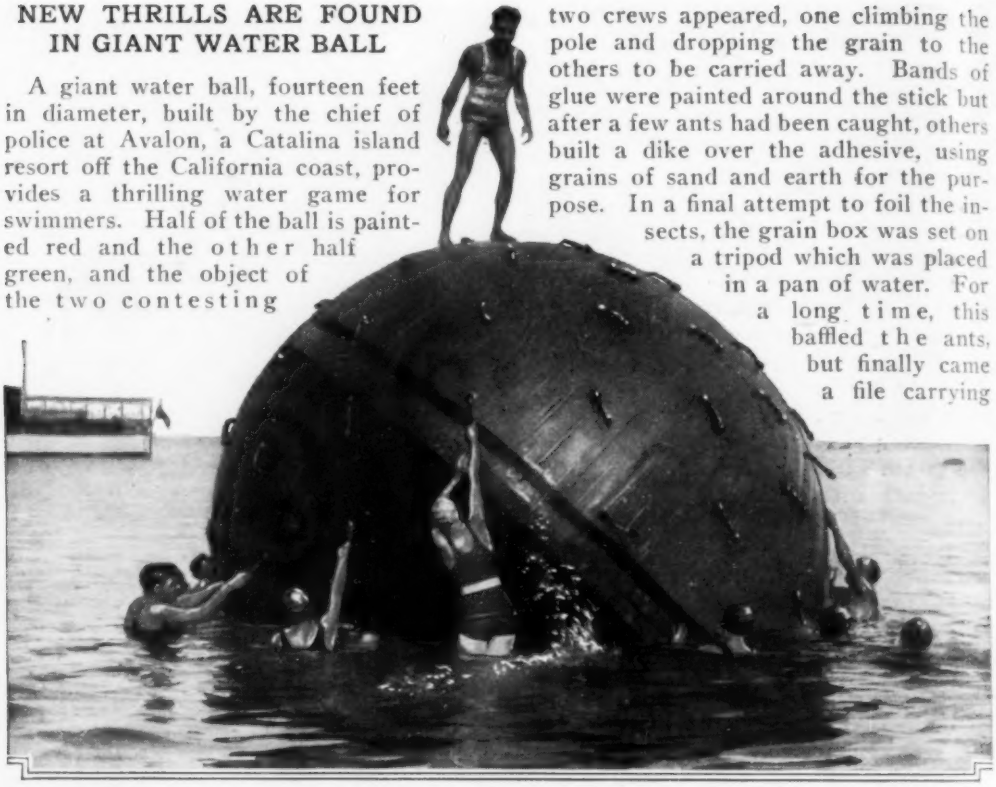


Hot-Water Bottles for Railroad Cars Being Filled

Cars on an Italian railroad are kept warm by hot-water bottles of steel, filled from the engine and placed under the seats. They are said to be sufficient for the journey, save the expense of plumbing and require but little repairing. When needed, more tanks are added or the hot water renewed.

NEW THRILLS ARE FOUND IN GIANT WATER BALL

A giant water ball, fourteen feet in diameter, built by the chief of police at Avalon, a Catalina island resort off the California coast, provides a thrilling water game for swimmers. Half of the ball is painted red and the other half green, and the object of the two contesting teams is to keep the color they have selected for their own above water. The ball is studded with short ropes by which it can be maneuvered.



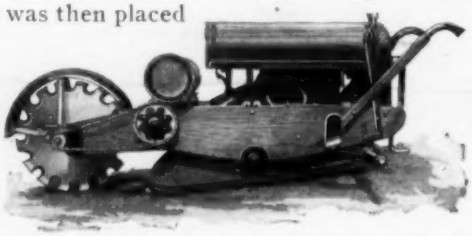
Water Ball Game in Which Duckings Are Frequent; Sides Are of Different Colors and Teams Try to Get Their Shade Out of the Water

ANTS DISPLAY BRAIN POWER BUILDING PONTOONS

Do ants think and reason? A French scientist reports experiments from Africa that would tend to support the theory that these insects do have a form of intelligence. Grain was placed in a box in a garden to attract birds, but the ants, a black species, discovered it first and made away with it. The box was then placed on a pole, but the ants quickly climbed the support and continued the robbing. At first, they laboriously carried the grain kernel by kernel down the pole, but on the second day two crews appeared, one climbing the pole and dropping the grain to the others to be carried away. Bands of glue were painted around the stick but after a few ants had been caught, others built a dike over the adhesive, using grains of sand and earth for the purpose. In a final attempt to foil the insects, the grain box was set on a tripod which was placed in a pan of water. For a long time, this baffled the ants, but finally came a file carrying leaves and tiny twigs. They formed a pontoon bridge to one leg of the tripod and so reached the grain. What interested the investigator especially was the fact that the ants evidently had formed a conception of the different natures of glue and water, and chose materials that would float to build the bridge, but used heavier substances to pass the glue.

AUTO MOTOR RUNS ICE CUTTER FAST AS MAN CAN WALK

Running on rollers somewhat like those of a caterpillar tractor, an ice cutter for rapid work is propelled by a small automobile engine. It is said to be especially adapted to use on small lakes, and will cut even thick ice about as fast as a man cares to walk.



For Rapid Ice Harvests, Saw Propelled by Auto Motor Runs on Rollers like Those of Tractor

HOTTER FLAME FOR WELDING IS FOUND

Industrial benefits are predicted from a process for producing a flame said to be much hotter than any hitherto known. Its temperature is estimated at 7,000 degrees Fahrenheit. Tungsten wire melted in it like an icicle in a gas jet; a tube of sheet steel was welded at the seam without solder, and when the flame was played on a plate of chrome steel, it left a string of puddles in its wake. It is produced in a blowpipe outfit similar to that used in welding or cutting steel on street-car tracks. An essential feature of the process is that the hydrogen used is handled in such a way that metals do not oxidize under the flame since they are surrounded by hydrogen gas at the heating spot. This is said to make possible the welding of such metals as aluminum and magnesium. They ordinarily fall into white powder when they are heated in air.

Gigantic Figure of Buddha, Carved from Living Rock, Which Was Accidentally Revealed When a Mountain Cave-In Opened the Shrine to Light

MUD GRIPS FIT ON AUTO TIRES WITHOUT MARRING WHEEL

Grips to aid in getting the car out of bad ruts, mud or snow, are clamped around the tire to the edge of the rim and can be put on or removed without scratching the wheel. They are made for balloon or cord tires and are easily adjusted with a setscrew.

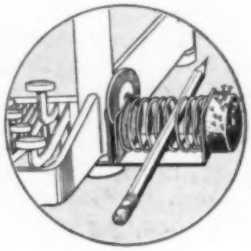
¶ Camels are believed to be the first animals used by man.

GIGANTIC FIGURE OF BUDDHA DISCLOSED BY CAVE-IN

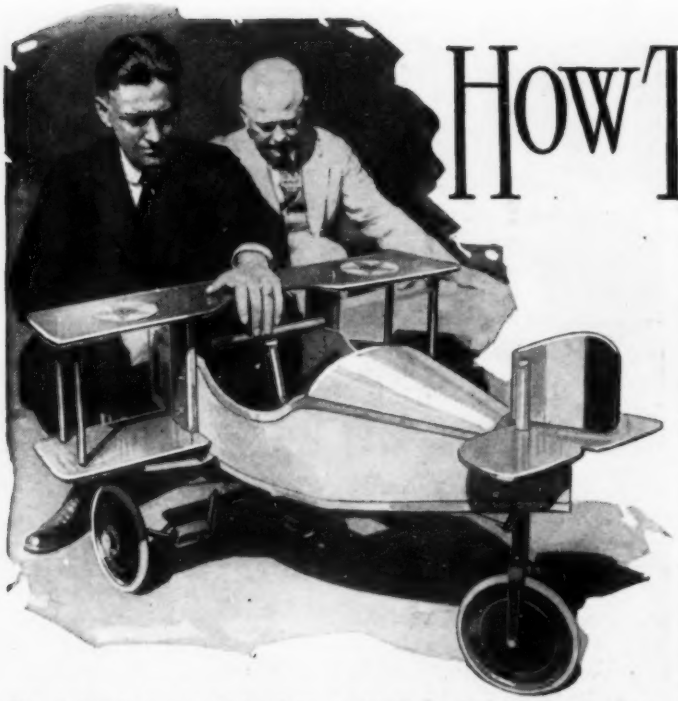
Partial collapse of a grotto among the mountains of western Tibet brought to light the gigantic figure of a Buddha that had been carved from the rock. The idol had been placed as though guarding the sanctuary. Its form and the finish of the carvings behind it showed that the makers were craftsmen of no mean skill.

HOLDER RACK ON TYPEWRITER FOR ERASER, PENCIL, PINS

Attached to the base of the typewriter, a holder rack for pencil, eraser, pens and pins, keeps these articles in handy position for use and saves table space. A coil spring grips the pencils securely, and the pins are easily removed from a cushion.



How Toys Are



Toy Automobiles Are Giving Way to Airplanes, Still Foot-Driven but with Wings and a Propeller That Revolves in the Breeze

TWO boys, one eleven and the other seven, were playing together years ago with a new toy their father had just brought home. It was a whirligig, propelled by a rubber band, and when the latter was twisted and the toy released it flew up to the ceiling and dropped back to the floor. The boys thought how fine it would be to have a big whirligig large enough to carry them up into the air, and out of that thought, years later, came the airplane—for the pair were Wilbur and Orville Wright.

A boy in Sweden, in the early days of the last century, was fond of building toys that worked. He heard a description of a windmill, something he had never seen, and with some borrowed tools he built one. Out of that interest in mechanics came a long series of inventions that included hot-air engines, the screw propeller for ships and, finally, the first iron-clad battleship, the "Monitor" of the Civil war. The boy was John Ericsson.

Another youngster, working in a tiny shop in the basement of his minister father's parsonage in a Minnesota town not so many years ago, saw a description in a boy's magazine of a contraption of tissue paper, feathers and rubber bands that would actually fly. He built one, and it worked. Trying to get a ship that would fly higher and farther, he built a second twice as big—and it wouldn't fly. His search for the reason led him into a study of aeronautics. Today he is the designer of a big all-metal airplane and head of one of the largest aviation factories in the country, the William Stout division of the Ford Motor company, named after him.

The part that toys have played in changing the world is beyond estimate. Great inventions and marvelous discoveries without number are traced back to the formative influence of a childhood toy. And the use of models, toy-sized replicas, is growing wherever great building and engineering feats are undertaken. The architect's wash drawing of a proposed new building is supplemented by an exact plaster model, often surrounded by other buildings or landscaping, so that the prospective owner can see, in the toy, just what he is to get in the finished building.

Revolutionized by the war, which cut off, in 1914, the importation of toys from Germany and Switzerland, the business of supplying educational and amusement devices for children has become distinctly Americanized, with strong emphasis on the educational angle. The old-fashioned tin soldiers, clock-spring locomotives, jumping jacks and similar things are being displaced by complete electric railroads, provided with lights, automatic couplers and the latest things in block signals; by construction outfits that build anything from a steel skyscraper skeleton

Changing the World

Sand Modeling Teaches Bui'ding, and Mechanical Sets Satisfy the Longing to Make Something

to a marvelously intricate piece of machinery; by laboratory outfits that enable the young chemist to perform surprising experiments at home, and by dozens of others, all calculated to help shape the child's mind for success in after life.

Instead of the little red wagon of twenty years ago, there are automobiles that are accurate scale models of real cars, with all the accessories from balloon tires to the windshield wiper. The supremacy of the toy automobile, however, is now being challenged by a similar foot-driven vehicle which has airplane wings and a revolving propeller. In the search for realistic toys, even the expressionless doll of the past is being displaced by models designed from famous cartoons and comic strip characters.

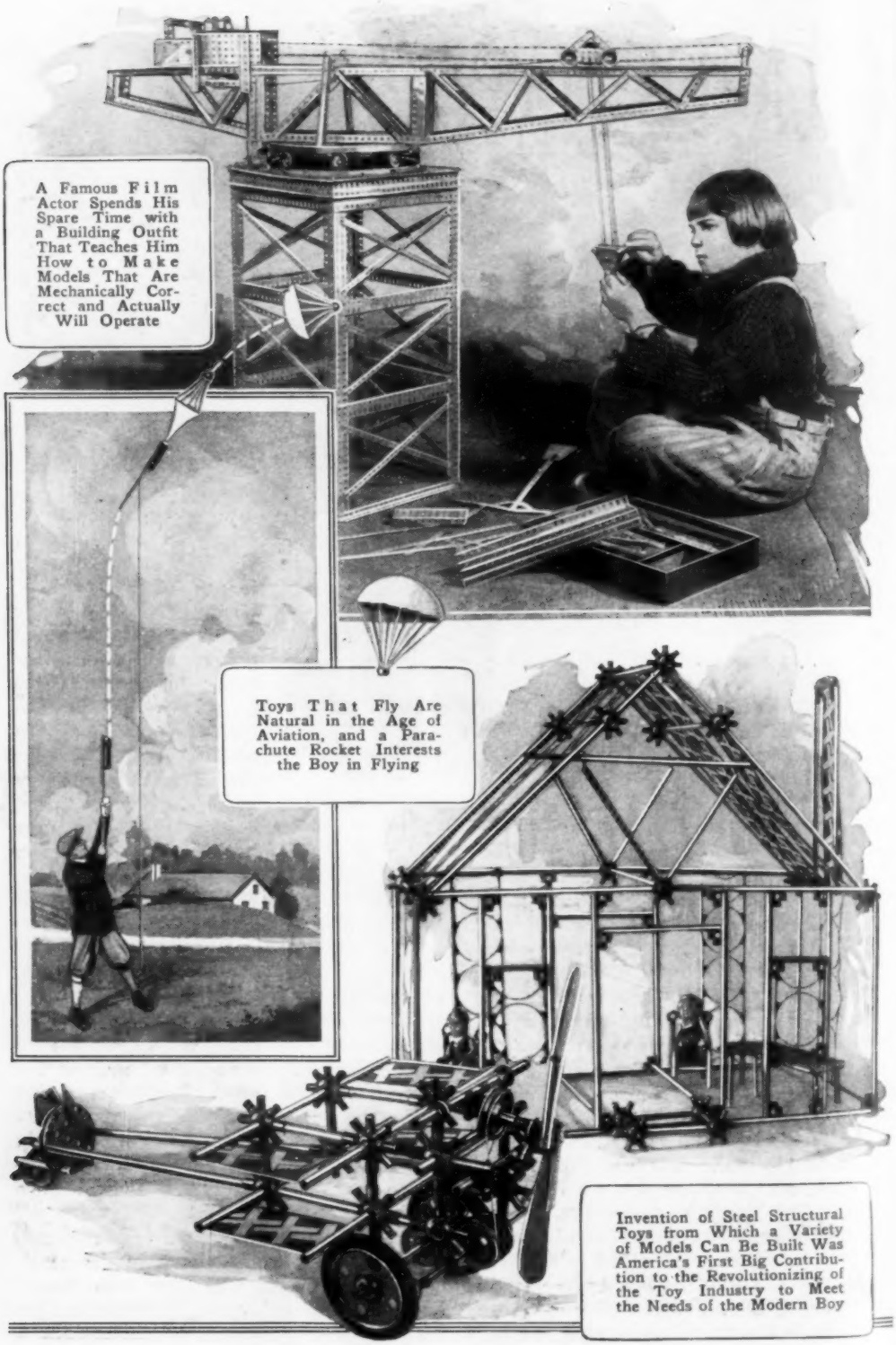
The demand of the American boy for toys "that will work" has been the biggest factor in building up the new toy industry. A generation ago a cast-iron fire engine, hitched to cast-iron horses and pulled along by a string, provided plenty of thrills, but the modern fire engine is an exact model of the latest motor-driven apparatus, is run by its own motor and has a pump that draws water and throws a stream six feet or so from a length of real rubber hose.

For the boy who has outgrown the foot-propelled automobile, there is now a car on the market driven by an electric motor, taking power from a storage battery. It has a speed of five miles an hour and will run ten miles on each charge.

The old-fashioned sand pile has even come in for modernization, with a set of metal forms which can be clipped together, packed full of sand, then taken down, leaving a complete sand village of houses and stores.

The modern boy of six or eight learns more about electricity than grown men knew a generation ago, for many of his toys utilize it. Even the toy steam engine is abandoning the alcohol lamp as a heating element, and is now operated by an electrically fired boiler that plugs in on the house-wiring circuit like a toaster or a curling iron.

The biggest advance in teaching mechanics, however, has been in the steel-construction sets. Starting with simple building girders, they rapidly adapted intricate gears, plain and beveled, pinions,



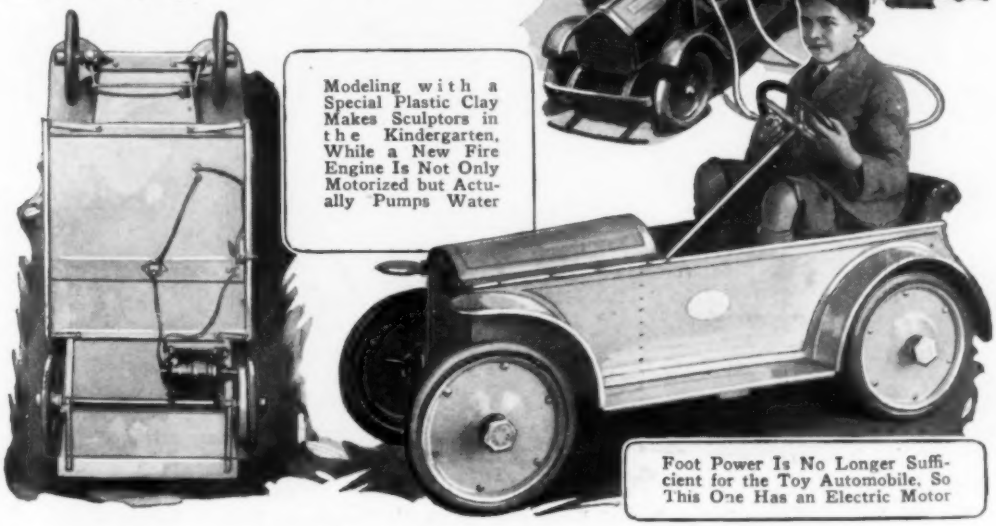
A Famous Film Actor Spends His Spare Time with a Building Outfit That Teaches Him How to Make Models That Are Mechanically Correct and Actually Will Operate

Toys That Fly Are Natural in the Age of Aviation, and a Parachute Rocket Interests the Boy in Flying

Invention of Steel Structural Toys from Which a Variety of Models Can Be Built Was America's First Big Contribution to the Revolutionizing of the Toy Industry to Meet the Needs of the Modern Boy

racks and other machine parts, until they enabled the erection of exact models of intricate machinery. With them a small boy quickly learns more about derricks, hoists, steam shovels and other big machines than his father ever knew. The desire to build things which they inculcate, is reflected in the improvement in toy tools. The old-fashioned lead saw, white-metal plane and chisel and cast-iron toy hammer have been replaced by good tools, as well made as any in father's kit. The class of things boys want to build has improved steadily, until now they undertake radio sets and cabinets, model ships and similar complicated work that no boy a generation ago would have thought of trying.

Modeling with a Special Plastic Clay Makes Sculptors in the Kindergarten, While a New Fire Engine Is Not Only Motorized but Actually Pumps Water



Foot Power Is No Longer Sufficient for the Toy Automobile, So This One Has an Electric Motor

Their elders, too, are building more models, for home decoration or industry, than ever before. Several of the large automobile factories produce all new-car designs in model form before undertaking production. The models are studied from every angle to make sure that the lines are harmonious, that tops are in the right proportion, fenders correctly designed, and that the car looks its worth. Some of the model automobiles are put to strange uses. Courts have turned to them to reconstruct the scene at traffic accidents and fix the blame. Window decorators employ many of them.

Out in California two boys who built model ships as youngsters kept on as they grew up and now, though barely in their twenties, have one of the largest model factories in the country. They produce complicated and exact ship models for steamship lines, plant models for many industries, and out of their profits have organized a company which owns a large seagoing yacht, to be employed in taking select parties on round-the-world cruises.

Building of toy models as a pastime for grown folks has never reached the proportions in this country that it has attained in England, but there is a constantly increasing demand for model parts and plans. Toy trains that actually work are the favorites abroad. Hundreds of amateurs in England build them as a hobby, complete in every detail and reproducing such famous engines as the one that pulls the crack "Flying Scotsman" from London to Edinburgh. Many of the model builders have home workshops and make every tiny piece that goes into their locomotives, while others buy rough castings, machining them on their home lathes, and still more get the finished castings from model makers and assemble them.

DIG UP CITY WHERE ABRAHAM OFFERED SACRIFICE

Walls, gates and towers of the city, where Abraham built the altar to sacrifice Isaac, where Jacob buried his idols and, according to tradition, Joseph was buried, have been found near Nablus in Palestine, it is told in reports from the international archæological expedition headed by Prof. Ernest Sellin of Berlin university. The excavations also revealed remains of a Canaanitish temple and of Baal images.

Chemistry Is Being Taught Future Research Experts by Toy Outfits That Enable Them to Perform a Host of Interesting and Startling, Though Harmless, Experiments Right at Home

BIG COAL STRIKE IN ENGLAND HELPED CLEAR AIR

Decrease in smoke and the consequent brightening of the skies incident to the coal strike in England have shown persons there the advantages of clean air and will aid in the adoption of fuels that do not defile the atmosphere, it is believed. The effect was in direct contrast to that which was produced by the hard-coal strike in the United States, when much more soft coal was burned in eastern cities, increasing the amount of smoke. Measurements have been made in this country of the quantities of dust and soot that fall in one year. In the dirtiest of the ten centers examined, it was found that 794 tons accumulated to the square mile in 1924 and, in the cleanest, the deposit was 101 tons. Much of the refuse from industrial chimneys is gritty ash, while smoke from domestic flues contains a high percentage of tarry matter which is injurious to plant life as it clogs the pores of the leaves and often kills the growth.

REAR WHEEL RUNS AUTO PUMP SAVING HAND LABOR

Rapid operation and ease of adjustment are claimed for a patented automobile tire pump that may be run either by power from the rear wheel or by the crankshaft of some autos through the starting-crank hole. For the wheel drive, permanent attachments are fixed on each of the rear pair and the pump is slipped into a clutch. Its driving gear is engaged as the wheel rotates after being jacked up. The rear tire of a small automobile was inflated to a pressure of sixty pounds in one and one-half minutes with this pump, the inventor declares. It folds into small space when not in use.

¶Limestone is used to a much greater extent in building than any other form of natural stone.

Inserting Can of Ice Cream in Thermos Bag, Which Serves as Substitute for Ordinary Tub with Its Melting Ice

THERMOS BAG FOR ICE-CREAM CANS ELIMINATES TUB

A thermos bag for ice-cream cans, claimed to keep the contents hard for fourteen hours, has recently been placed on the market. It avoids the icing of a shipping tub, and the sloppy mess the latter makes when the ice begins to melt. Heavy express charges on the return of water-soaked wooden containers to the manufacturer are also saved.

MUSICAL WHISTLE ON ENGINE WON'T DISTURB SLEEPERS

Locomotives of a western railroad are being equipped with an improved "chime" whistle, sounds from which are described as "soft as the wood winds of a symphony orchestra." While the mellow tones can be heard as far as the screech of the usual type, experts declare, they are not likely to rouse residents along the right of way from their slumbers.

Examining the Electric Stoker; Fuel Bin Is Seen at Right, with the Ash Chute in the Foreground, and Motor under Hopper

"ELECTRIC MAN" FIRES FURNACE AND REMOVES ASHES

Electrically operated, an automatic furnace tender now on the market, puts on fuel when it is needed, shakes the fire, removes the ashes and adjusts the dampers without the aid of a human attendant. It can be used in connection with various styles of furnaces in which coal of the smaller sizes is burned.

WHERE OUR CHRISTMAS TREES GET THEIR NAMES

The Douglas fir, a native of the northwest but now being planted extensively in the east, is becoming a popular Christmas tree, according to the American Forestry association. The Douglas fir was named for a Scotch botanist who discovered it on an exploration trip in 1825, but its scientific name is pseudotsuga, meaning "false hemlock." As a matter of fact, it is neither a hemlock nor a fir, and, though it is sometimes called a spruce, it isn't that either. The tree belongs to an entirely distinct species. The tree most commonly used for Christmas trees is a real fir—the balsam, so called because its blisterlike pockets yield the resinous liquid known as Canada balsam, which is used, among other things, for attaching cover plates to microscopic slides.

GIGANTIC LIZARDS CAUGHT IN MALAY

Dragons such as adorn the Chinese flag have been brought nearer to reality in the capture of two huge lizards on the island of Komodo in the Malay archipelago. Each is eight feet long, weighs 200 pounds and has a body as thick as a man's, covered with a protective armor. Like the legendary dragon, they have red, forked tongues and sometimes make a loud hissing noise resembling escaping steam. Their legs are short and stubby and each foot has four claws. The tails are spiked. Scholars believe that the lizards, which were brought to the United States, may be descendants of an ancient species that inspired early belief in fiery dragons. They were captured by Douglas Burden, a trustee of the American Museum of Natural History, after a British aviator had sighted them from an airplane.

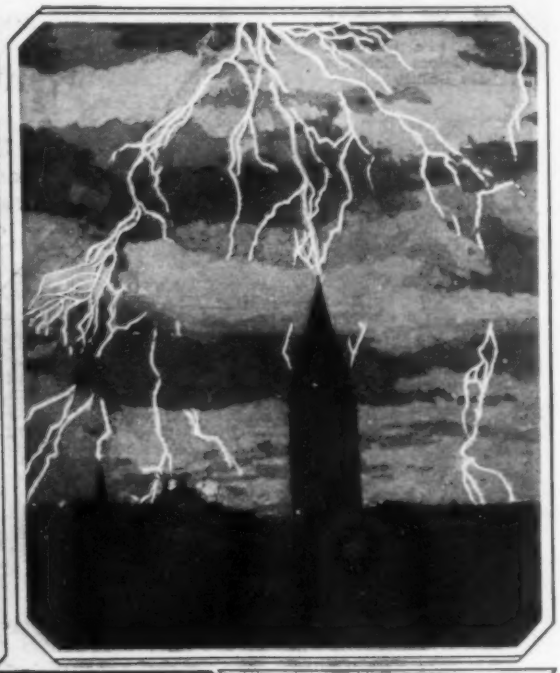
SHOE POLISH IN STICK FORM EASILY CARRIED AND USED

Held in a container like that used for shaving soap, a stick of shoe polish fits the coat pocket, is easily applied and reduces waste. A large stick is said to last for a year.

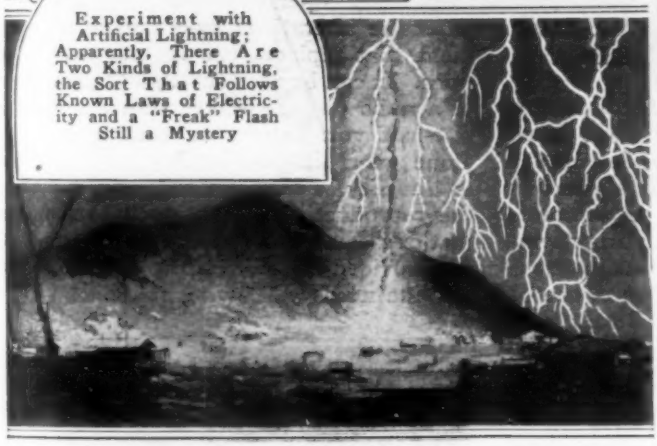
Stick of Shoe Polish Compared with Brush; Fingers Are Protected from Stains

FREAK LIGHTNING FOUND TO BE MOST DANGEROUS

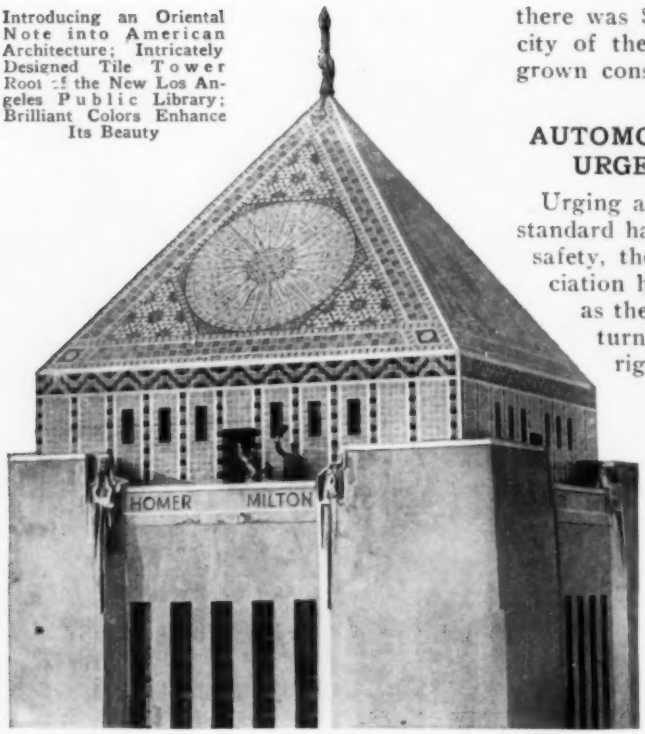
Experiment with Artificial Lightning; Apparently, There Are Two Kinds of Lightning, the Sort That Follows Known Laws of Electricity and a "Freak" Flash Still a Mystery



Lightning Rods Have Proved Effective as Protectors against the Ordinary Variety, but the Freaks Often Cause Damage in Spite of Conductors; Each of the Streaks at Left Has Voltage a Million Times That of House Current



What is lightning? Dr. D. E. Dorsey, of the National Research council, has attempted to answer this question, declaring that lightning is of two kinds. One variety follows the normal laws governing electricity. The other variety, by far the most dangerous in the havoc it may work, originates not in electric sparks and flashes but is a self-contained body of material and electrical particles which catapults toward the earth obeying no natural laws at present known to men of science. During an investigation conducted by F. W. Peck, Jr., lightning expert of the General Electric company, to determine the manner in which lightning causes surges in transmission wires and power-plant equipment, it was discovered that the voltage, the force behind an ordinary lightning bolt, is nearly a million times as strong as the force behind the current in the socket at home. No less wonderful is Mr. Peck's estimate that a single flash of lightning may carry power at the rate of 50,000,000 kilowatts, twice that which would be generated throughout the United States if all dynamos and power plants in the country were working simultaneously.



Introducing an Oriental Note into American Architecture; Intricately Designed Tile Tower Roof of the New Los Angeles Public Library; Brilliant Colors Enhance Its Beauty

LIBRARY ROOF IN TILE MOSAIC BEARS ELABORATE DESIGN

Constructing the roof of the Los Angeles public library is said to have taken more time than was required for all the rest of the building, as it was finished in thousands of pieces of tiles, set in colorful and intricate designs. The bright patterns are visible far away, especially those on the roof of the tower, which is one of the chief features of the structure.

PHILADELPHIA BUILT ON GOLD BUT DOESN'T MINE IT

The city of Philadelphia rests on a fortune in gold, according to old records of assays made in 1861, but the metal does not appear in sufficient quantities to make recovery worth while. In fact, the assays showed values of three cents to each 120 pounds of clay. With only one part of gold in 1,000,000, even modern mining methods would not make the recovery pay. The investigators who made the old survey, however, and whose report has recently been uncovered, estimated that there was $126,000,000 in gold under the city of their day—and Philadelphia has grown considerably since then.

AUTOMOBILE SAFETY SIGNALS URGED FOR ALL DRIVERS

Urging all automobile drivers to adopt standard hand signals as one step toward safety, the American Automobile association has compiled the following list as the best and simplest: For a left turn, extend the arm horizontally; right turn, extend the arm upward above horizontal; to indicate a stop, extend the arm below the horizontal line. The suggestions concentrate on just the three positions of the arm which are easily remembered and clear at a distance.

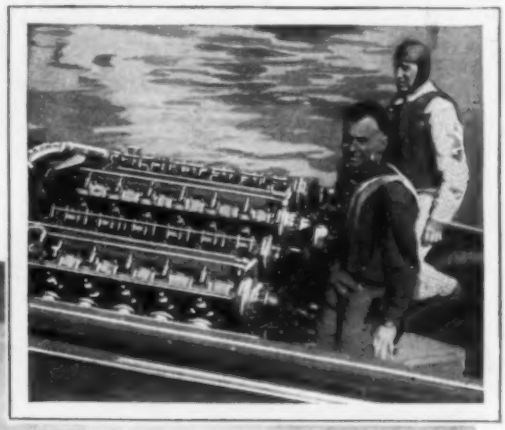
PHONOGRAPH WITH ELECTRIC ARM HAS RICH TONE

Ordinary phonographs are operated electrically without extensive alterations by a simple attachment that replaces the regular arm and horn. It can be used through the medium of a radio power speaker with a one and one-half volt battery or with a speaker alone on a six-volt battery. In volume and quality of dance records, for instance, the reproduction is said to approximate that of a small orchestra, and adjustments are provided for moderating the sound to suit the needs of a living room.

Electric Arm Adjusted to Ordinary Phonograph; Tones May Be Modulated and Installation Is Simple

SUPER-SPEED BOAT KEEPS TROPHY FOR AMERICA

Capable of making eighty-one miles an hour, and said to be the fastest boat afloat, the "Miss America V," Gar Wood's latest speed creation, succeeded recently in keeping the famous Harmsworth trophy in the United States, to which Wood brought it half a dozen years ago. The trophy was donated by the late Lord Northcliffe, who was a Harmsworth prior to his elevation to the peerage. "Miss America V" led her sister ships, the "Miss America IV" and "Miss America III" across the finish line, after the only foreign entry, a French contender, had been distanced by more than three miles. The winning boat is propelled by two twelve-cylinder engines capable of developing 1,100 horsepower.



Gar Wood's New Craft Which Kept the Harmsworth Trophy in America, and, in the Inset, the Owner (in Helmet) and His Mechanician

LONG LINE OF CONCRETE EARS IS AIRPLANE DEFENSE

England's southeast coast is being equipped with a new form of airplane detector, built of concrete. The detector consists of a series of disks, like huge plates, eighteen to twenty feet in diameter and supported on short legs a foot or so above the ground. A length of pipe, to contain a delicate microphone, sticks up from the center, while each disk is surrounded by a concrete protecting wall, a foot outside its outer rim. The disk catches the sound waves striking its entire surface and transmits them to the microphone, which is connected electrically to a distant observatory, where the plane's direction and speed are estimated.

TELESCOPE PENCIL AS RULER AID TO DRAFTSMEN

Fashioned in three telescoping sections, a metal pencil is a one-foot rule when extended, and when collapsed, is of ordinary size, so that it saves space in the draftsman's or artist's kit. It is also useful to carpenters and mechanics.

Pencil Extended for Ruling; Sections Collapse into Single One at Base

WOMAN

Helen Filkey, Left, Set Three World's Records in One Day; Gertrude Ederle, Above, Made Another

Mlle. Jean LaCosta, Famous Auto Racer, Who Set New Speed Marks on the Sands of Daytona Beach, and, at Right, Miss Glenna Collett, Holder of Many Championships in the Golf World

CHAMPIONS

Helen Wainwright, National and Olympic Diving Champion, Above, and at Left, Helen Wills

Lydia Hutchinson, Heroine of the American Dog Derby at Ashton, Idaho, with "Old Maje," Her Lead Dog, and, Above, Mabel Strickland, World's Champion Cow Girl, Who Won Back the Title She Had Held for Years in Recent Chicago Rodeo

Three Right-Hand Photos © U. & U.

BOOK HOLDER ON TYPEWRITER SIMPLIFIES COPYING

Adjusted on Holder near Typewriter, Big Book Is Easily Copied and Protected from Damage

To save trouble in typing from large volumes, an attachment invented by a Texas man supports them in a convenient position for the operator, protects the books and saves desk space. It is intended especially for handling large court records.

HALF OF WORLD'S GOLD OUTPUT GOES TO ORIENT

India and China absorbed seventy per cent of all the silver produced in the world last year, while India alone took more than half of the total gold production, according to official reports. These facts have been overlooked in the westward rush of gold across the Atlantic since the war. Thirty-four per cent of the amount of gold imported by India last year came from the United States. That country also is the greatest market for American silver, buying all but about 2,700,000 ounces of the total amount produced here in 1925. The value of India's gold imports last year was three times that of the silver. Almost all the metal is hoarded or used for ornaments, and the wide demand for it has caused economists to speculate as to the possible effect that may be produced on world supplies. In 1925, while silver production declined over the previous year, gold barely held its own. Further troubles are expected in the silver industry if India's trend toward gold continues. The chief difficulty in the silver question is said to be to find markets, not the curtailed supply. Eighty per cent of it comes as a by-product in the smelting of lead, zinc and copper, large amounts of which have been produced in the last few years.

GENERATOR THAT COULD LIGHT HOMES OF A MILLION

Capable of supplying 80,000 horsepower of electrical energy, a huge generator at an eastern plant, could light 300,000 six-room homes, sufficient to house 1,000 000 persons. A generation ago, it would have met all the electrical needs of the city of New York. It is sixty feet long and consumes thirty tons of coal an hour. For steam-condensing purposes, 96,000 gallons of water are required every minute.

Big Generator Dwarfs a Full-Sized Man; It Can Supply Current Enough for 300,000 Six-Room Houses

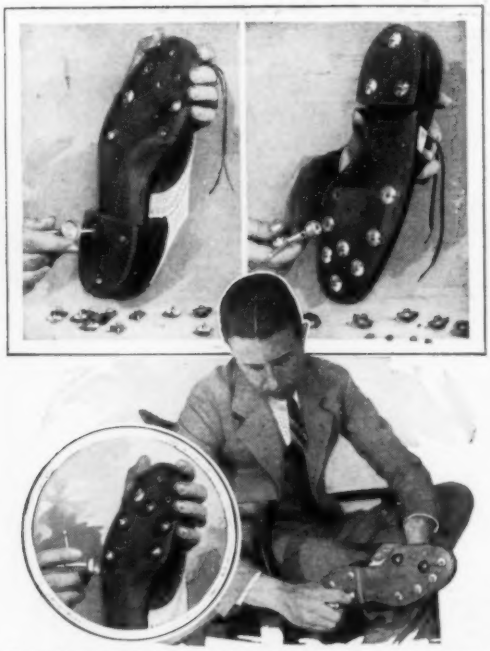
WIZARD OF THE FORGE FASHIONS FLOWERS OF IRON

Mr. Cran and Samples of Artistic Pieces He Forged in Iron

Working in an ordinary blacksmith shop, with crude tools, James Cran of Plainfield, N. J., has attracted wide attention by reproducing the beauty of flowers in metal. The only tools used were a cross-peen hammer, tongs of various sizes, pliers, and one or two other simple implements, all of which were made by the smith himself. Mr. Cran works entirely from memory, using no model. He studies his object closely, fixes it firmly in his mind and then starts to work at the forge.

PLAN TO CHART MYSTERY PEAK WITH A FLYING BOAT

Mt. Everest is not the only peak that has defied the adventurer. In British Columbia, the highest mountain of the province, at the head of the wild Homalko canyon, has successfully repulsed expeditions, and only last summer it defeated the efforts of two parties to reach the summit. But it will not go uncharted, say the explorers, and plans are now under way for an air conquest of the rocky spire, using a flying boat from which to take photographs and records for surveyors. The peak is believed to have first been sighted in the '80's, when a route was being sought for a transcontinental railroad. Calculations showed that its height was in excess of 13,000 feet and it may even challenge Mt. Rainier's 14,400 feet, engineers believe. The difficult barriers that lie about it have taxed the hardihood of experienced mountaineers. One of the few ways of entrance is by the Homalko river, the "Terror of the North." Its muddy eddies have trapped many boatloads of equipment sent in to establish a base for expeditions that hoped to reach the top of the peak. It is proposed to name the mountain after George Dawson, a pioneer geologist.



Inserting the Spikes, Rubber-Tipped Pegs and Screws; Same Tool Can Be Used for All

THREE PAIRS OF SHOES IN ONE WITH DETACHABLE SPIKES

Sharp metal spikes, round rubber pegs or flat brass slugs for street wear, are quickly screwed into sockets on the soles of a special golf shoe, affording the service of three pairs from the one. A wrench with screwdriver attachment, prongs for the spikes and a knurled socket for the pegs simplify inserting or removing the units. A complete change can be made in less than five minutes.

WAFFLE BROWNED, IRON OPENS SAVING WORK AND BURNS

When the waffle is properly cooked, the top of an electric iron automatically flies open and the attendant is spared the task of repeated inspections and the risk of burning the food. A simple timing device operates the lid and it can be set at any one of three different adjustments for various degrees of browning. The iron has been treated in such a way that grease is not needed, the manufacturers report.

MILLIONS OF MILES OF SILK GIVEN RIGHT OF WAY

A fortune in silk, 780,000,000 miles of thread from the cocoons of Japan, and valued at $6,000,000, recently broke all records when it was rushed across the continent in a special train that had the right of way over even the fastest limited. The silk special made the run from Seattle to Chicago in fifty-nine hours thirty-six minutes, slightly more than half a day under the limited schedule of seventy-two hours. The silk specials are used to get the raw material from the Pacific coast docks to eastern factories to cut down the high interest charges, which in this case amounted to $900 daily on the 5,200 bales.

WINKER FOR AUTO STOP LIGHTS HELPS PREVENT ACCIDENTS

Attached to the underside of the auto floorboard and connected in the stop-light circuit, a flasher unit causes the signal to wink about sixty times a minute when the brakes are applied, to help attract the attention of motorists in the rear. This leaves no doubt as to the intention of the driver, and the flashing can be seen for a considerable distance, affording ample warning in time to slow down and prevent collisions.

ICE CREAM FROM CRUDE OIL FREAK OF SCIENTISTS

Ice cream made from crude oil was recently described at a chemical convention by Prof. James F. Norris. He explained that ordinary crude oil, by extension of the cracking process used to increase its gasoline yield, could be re-formed in new atomic combinations which yielded edible fats, identical with those occurring in ani-

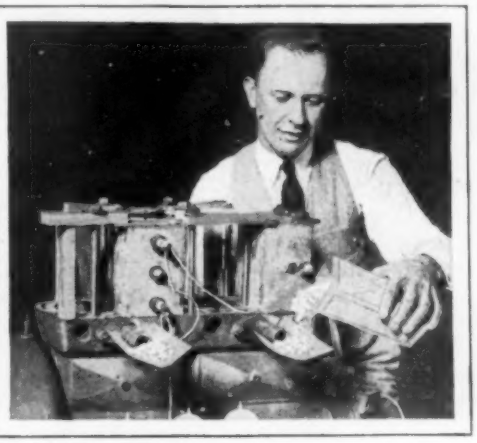
mal and vegetable matter used for food. Not only can the product be used for ice cream, but different combinations will yield alcohol, acids, flower perfumes, fruit flavors, drugs and all sorts of dyes. He also announced that glycerin could be obtained from petroleum.

SYNTHETIC RUBBER FROM POTATOES

Chemists are experimenting with corn and potatoes as a source of materials for the manufacture of synthetic rubber, it is reported. The vegetables are first converted into alcoholic products which can be used in rubber making. While the process is not yet commercially profitable, investigators declare that the measure of success already attained, promises well for the future.

GRAIN DUST IS USED AS FUEL TO RUN AUTO MOTOR

Successful experiments with various kinds of dust as fuel for motors indicate that a substitute may be found for gasoline in materials that are relatively cheap and plentiful, engineers declare. For instance, workers in the department of agriculture have rigged an automobile engine so that it can be run by grain dust, and it is said that the method opens a way for large savings to farmers. Motors have been run on similar principles in Germany.



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Using Corn Starch as a Substitute for Gasoline as Fuel to Run Automobile Engine

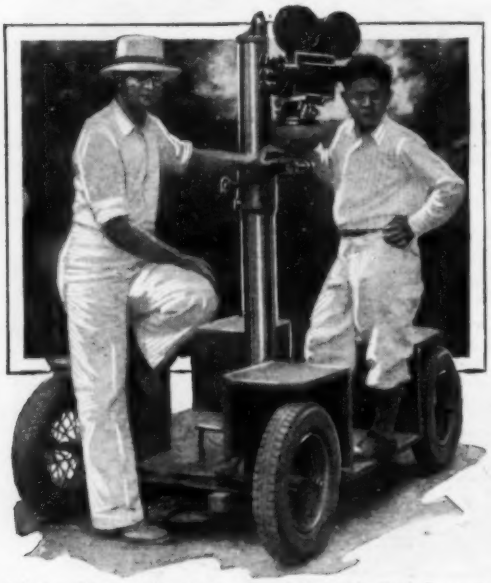
Dr. Dixon Holding a Surf Bird, and a Closer View of the Nest with Its Four Peculiarly Marked Eggs

NEST SOUGHT FOR CENTURIES FOUND IN ALASKA

What is believed to be one of the longest hunts ever made for a bird's nest has recently ended with the finding in central Alaska of the home of the surf bird, a "mystery" flyer that has been observed in migrations all along the Pacific coast of both Americas, but whose nest has escaped the search of scientists for 200 years. The discovery is credited to Dr. Joseph Dixon of the University of California. Four eggs were found.

¶Popular Mechanics Magazine does not publish the name of the maker or seller of any device described in its pages, but this information is kept on file and will be furnished, free, by our Bureau of Information.

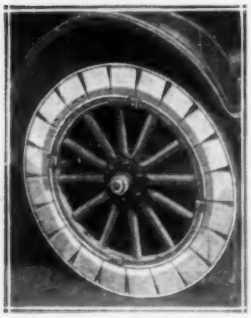
ROD SUPPORTS MOVIE CAMERA AS TRIPOD SUBSTITUTE



Motion-Picture Camera on Its Adjustab'e Rod Support and Rubber-Tired Truck

In place of a bothersome tripod, a tubular-rod mounting was used for the motion-picture camera in filming a Texas scene, and with great success, it is reported. The support was mounted on a light, rubber-tired truck and the instrument was counterbalanced on swings, pivoting in such a way that a touch was all that was necessary to adjust it up or down or in any direction. This great mobility is considered an important advantage over the usual tripod.

SPARE TIRE OF WOOD BLOCKS COSTS LESS THAN RUBBER



Said to cost less than half the price of a rubber casing and inner tube, an emergency spare tire for the automobile consists of interlocking spruce blocks incased in steel bands and with a steel tire shrunk on. It affords ample protection for the rim and does not make riding uncomfortable, according to reports. A feature is that no rivets or bolts are used, metal connections being held by spot welding.

BARRIERS AND HAIRPIN BENDS ADD THRILLS TO AUTO RACE

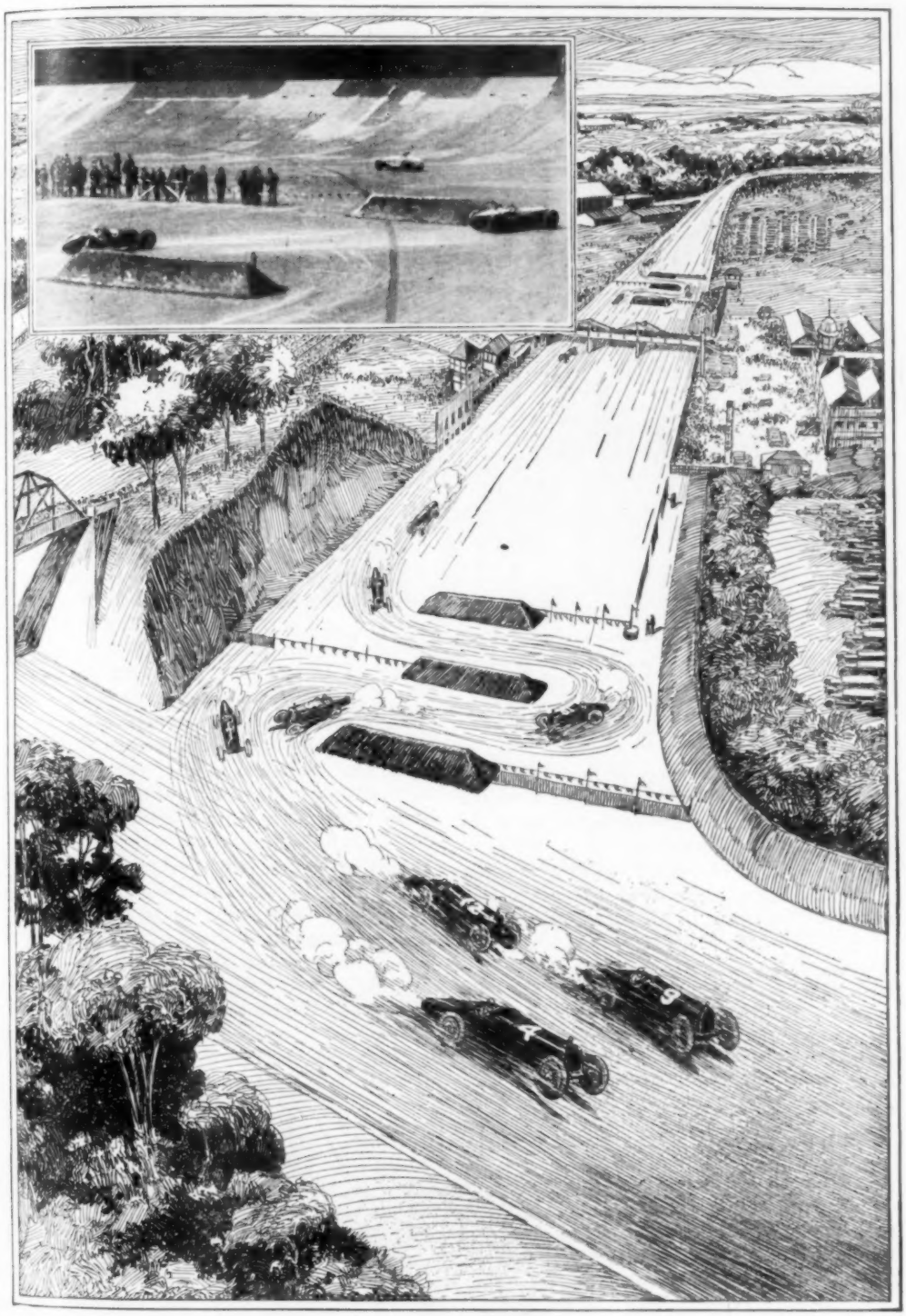
Novel features were introduced this year at the first Grand Prix international auto race run in England on the Brooklands track. The distance was 287 miles and, in order to provide the spectators with plenty of interest and to test the skill of the drivers, twists and turns were incorporated in the course. In the straightaway at the finish, two obstacles in the form of short banks of sand were placed so that competitors had to drive around them. A steel bridge was built across the track to allow visitors easy passage to the reserved inclosure. The race was won by France at an average speed of seventy-one miles an hour in a running time of four hours fifty-six seconds.

WATCH SERVING AS CUFF LINK IS PROTECTED BY SLEEVE

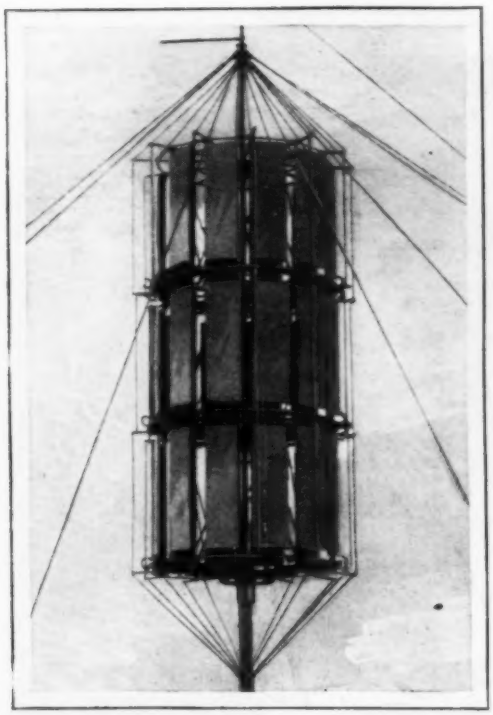
An interesting form of the wrist watch has appeared in a small timepiece that can be worn as a cuff link. It is always in a convenient position for use and has the additional advantage of being protected against breakage of the crystal or other injury by the coat sleeve.

DAY LENGTHENING AS MOON RECEDES FROM EARTH

Days on earth are growing longer and the moon is gradually getting farther away from us, according to Prof. Harlow Shapley, director of the Harvard observatory. However, there is no cause for immediate alarm, as the slowing of the earth due to the tidal pull of the moon amounts to only one-thousandth of a second in a century, while the moon is receding only seven feet in 100 years.



Sand Banks Resembling Golf Bunkers Turned an English Automobile Classic into an Obstacle Race, with the Drivers Demonstrating Their Skill in Turning Corners at High Speed



Ready to Catch Breezes from any Direction; Windmill with Perpendicular Blades for Generating Power

VERTICAL BLADES ON WINDMILL TO GENERATE POWER

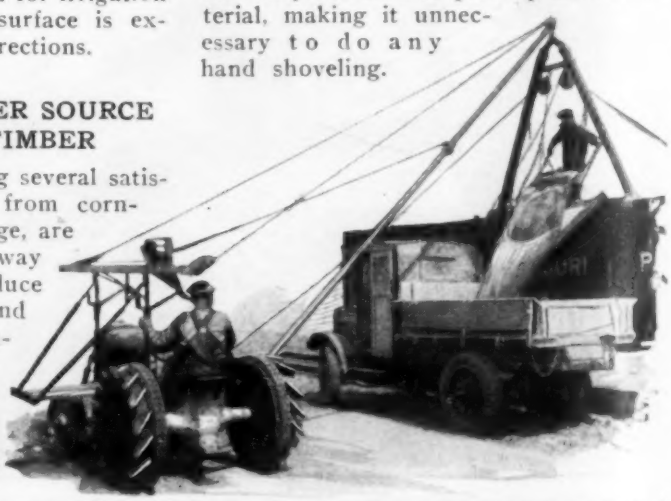
Individual fans are set in perpendicular fashion instead of radiating from a center in a windmill a western inventor has constructed. He intends to use it for generating electric current and for irrigation purposes. An extensive surface is exposed to the wind in all directions.

CORNSTALK AS PAPER SOURCE TO HELP SAVE TIMBER

Experiments in preparing several satisfactory grades of paper from cornstalks, at Iowa state college, are held to indicate that a way may have been found to reduce the inroads on timber and to afford the farmer an income from what is now chiefly a troublesome waste and the winter abode of a destructive pest, the corn borer. The cornstalk product has been made in different qualities from a coarse box kind up to the finer grades for writing purposes. Cooked liquors from the stalks furnish a strong adhesive material which can be used in the making of box board, in billposting and for other purposes, it is reported. It is also pointed out that the stalks require only eleven days for seasoning, whereas wood needs nine months to two years, and only one hour of cooking is necessary for corn pulp against forty-eight for wood. The stalk paper also takes ink satisfactorily without calendering and sizing.

TRACTOR OUTFIT UNLOADS CARS SAVING HAND SHOVELING

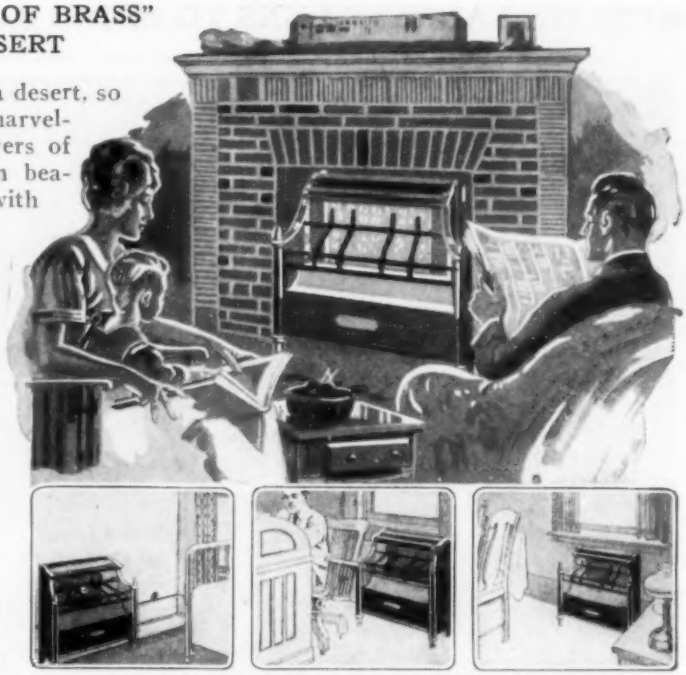
From six to eighteen cars of sand, gravel or other loose material may be unloaded in one day with a combination tractor and scraper outfit, it is claimed. The capacity depends upon the number of men in the crew and the size of the apparatus. The rigging consists principally of a frame support clamped to the side of the car and a tractor to pull the scrapers which are dragged through the car and dumped in a chute that empties into a truck at the side. When a car is unloaded, the outfit is quickly moved to another with the tractor and made ready for work in a few minutes. Only one man is required to do this. A farm tractor of common type, with simple attachments, may be used. The scrapers are so designed that they are said to pick up all the material, making it unnecessary to do any hand shoveling.



Tractor-Scraper Rigging for Unloading Cars of Loose Material; Entire Outfit Is Easily Moved to Another Car and Attached

SEEK FABLED "CITY OF BRASS" IN SAHARA DESERT

Somewhere in the Sahara desert, so runs the Arab legend, is a marvelous city with two tall towers of brass that gleam like twin beacon fires in the sunshine, with walls so long that it takes a camel two days to walk around them and with twenty-five hidden entrances. The bodies of soldiers and merchantmen lie skriveled in the silent streets, for the city's residents were starved by a seven-year drought, and the drifting sands have all but covered the dwelling places. Bent on finding it, if there is such a city, a French expedition has been sent to traverse some 2,000 miles of desert paths from Tugurt to Timbuktu. Explorers believe that if this "City of Brass" is not found, others will be discovered, for the sand drifts are known to hide many a settlement whose inhabitants probably starved to death during long rainless periods, were killed by invaders or abandoned their towns for others where there was water. Many of the old tales of this kind, when sifted down, have been supported, to a degree at least, by fact. The city of Troy is no longer regarded as a myth and the cave that doubtless inspired the legend of the Minotaur has been explored. Recently, an expedition from the University of Chicago visited the "Nameless City" of the Syrian desert and photographed paintings on the walls just in time to preserve the record, for the ancient murals were obliterated by the Arabs as soon as the British troops had been withdrawn.



Heater in Typical Uses; It Can Be Carried to Any Part of the House and Is Quickly Put into Operation

HEATER THAT BURNS GASOLINE SERVES AS FIREPLACE

Said to radiate a clean, warm, odorless heat, a portable grate burns gasoline and requires no pipe or hose connections of any kind. The fuel is carried in a tank below the upper part, and is made to generate gas for operation in four minutes. Guards are bolted to the side of the radiator to keep out papers, curtains, etc.

WARMLY LINED SLEEPING BAG CARRIED IN SHAWL STRAP

Weighing but ten and one-half pounds, a waterproof sleeping bag is lined with down or wool and fits snugly about the head and shoulders to keep out drafts. An additional feature is a flap that may be supported by sticks to afford a shelter from the wind. The bag can be rolled into a small parcel that may be carried in a shawl strap.

Shield for the Head Is Feature of This Sleeping Bag; It Is Seen Folded Up at Left

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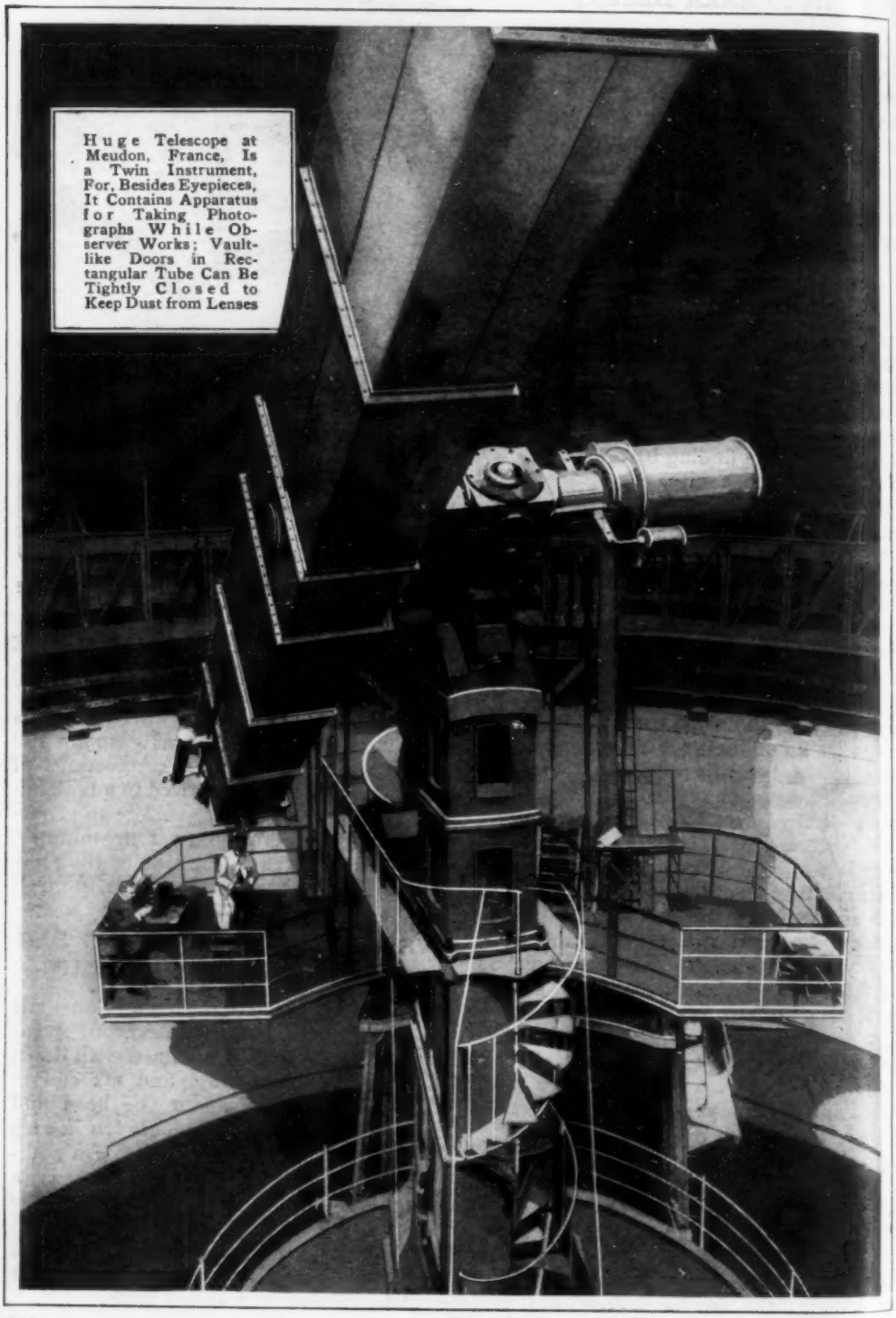
Write our Bureau of Information if you wish to know who makes or sells any articles described in this magazine. Send no postage; the service is free.

WORLD'S LARGEST LENS TO BRING STARS NEARER US



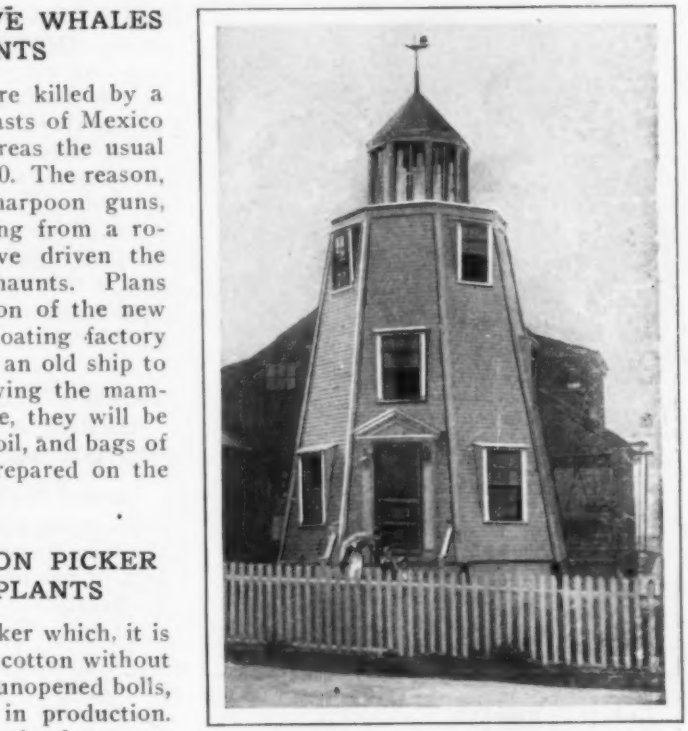
Huge Telescope at Meudon, France, Is a Twin Instrument, For, Besides Eyepieces, It Contains Apparatus for Taking Photographs While Observer Works; Vault-like Doors in Rectangular Tube Can Be Tightly Closed to Keep Dust from Lenses

GUN HARPOONS DRIVE WHALES TO NEW HAUNTS

Only seventy whales were killed by a fishing company off the coasts of Mexico and Alaska this year, whereas the usual number has been around 350. The reason, experts declare, is that harpoon guns, which have reduced whaling from a romance to a business, have driven the monsters from their old haunts. Plans are being made for invasion of the new resorts next year and a floating factory has been constructed from an old ship to save time. Instead of towing the mammals to shore after capture, they will be brought back as barrels of oil, and bags of bone dust and fertilizer prepared on the traveling reduction plant.

AUTOMOBILE COTTON PICKER PROTECTS THE PLANTS

An automatic cotton picker which, it is claimed, will pick matured cotton without damaging the plant or the unopened bolls, has recently been placed in production. The machine is said to be the first practical cotton picker of its type. It consists of an automobile with pneumatic tires and an arched frame, from which is suspended two revolving cylinders studded with needlelike steel fingers. The cylinders are turned by the same motor that drives the machine, and timed to revolve at the same rate as that at which the outfit moves forward. In operation, the machine straddles the cotton row, with the plants passing between the two cylinders. The fingers catch and extract the fully matured cotton, revolving as they do so at a high speed on their own axles, and then, as they are withdrawn from the blooms, stripper bars remove the cotton and a suction pipe carries it to a storage compartment. The difficulty in building a picker is that it must not damage unripe bolls, since cotton matures over a period of weeks.



Lighthouse Tower Cottage at Seaside Resort; It Contains Ten Rooms and Three Baths

COTTAGE BUILT AS LIGHTHOUSE AFFORDS WIDE VIEW

Containing ten rooms and three baths, a summer cottage on the Massachusetts coast resembles a lighthouse. Its shape affords a view of the ocean and a breeze through almost every window.

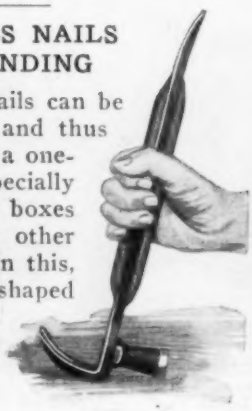
Picking Cotton by Auto; the Machine Straddles the Row and Is Said Not to Injure Plants or Unopened Bolls

Grindstone Shaft Forces Shovel Repeatedly through Rock, to Determine the Tool's Lasting Qualities

"MECHANICAL MAN" TESTS LIFE OF RAILWAY SHOVELS

To determine how long shovels used by laborers in handling rock ballast will stand up under the constant wear, the Los Angeles street railways have constructed a "mechanical man" which automatically shovels rock until the shovel is worn out. Samples, heavily weighted with railroad iron to make them dig in, are connected to a support operated by an extension of the shop grindstone shaft.

HAMMER PULLS NAILS WITHOUT BENDING

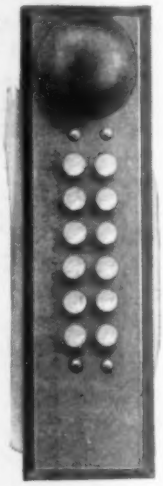


Shaped so that nails can be pulled straight up and thus kept from bending, a one-piece hammer is especially useful in opening boxes and in performing other odd jobs. To aid in this, the opposite end is shaped like a pry bar. The handle and head are made of solid steel.

COLOR OF GOLD DEEP ORANGE INSTEAD OF YELLOW

Gold is not yellow in reality, but a deep orange color, according to metallurgists. White light reflected from it gives it the familiar yellowish hue as the true color is diluted. The precious metal assumes other shades besides yellow and orange. Ground into a fine powder, pure gold becomes ruby-red. This rich color is commonly seen in the special glass used for photographic dark-room lamps.

LOCK WITHOUT KEY OPENS AT TOUCH ON BUTTONS



Instead of key and keyhole, a master lock for doors is opened by a system of buttons arranged in parallel rows below the knob. They are said to be proof against tampering, and the door can be opened only when the buttons are pressed in a certain order. The combinations can be varied and different ones used on different doors.

NEW MOTORIST MORE CAREFUL THAN EXPERIENCED ONE

No matter how long a man has operated a car, he always has something to learn about careful driving, according to Thomas P. Henry, president of the American automobile association. He cites accident reports to show that the experienced driver is often a greater offender than the beginner, and that a motor pilot with ten or twelve years' training frequently develops a careless attitude, takes too great risks and, consequently, is a greater menace to public safety than the driver who is just beginning. As an example, one large city reported only twenty-three accidents that involved persons who had been driving three months or less, during the first quarter of this year, while sixty-four were registered against motorists whose experience varied from three months to a year. Those who had

driven from two to five years, and who had accidents during that first quarter period, numbered 405, while 688 were practiced operators with records of five and more years' standing. Mr. Henry made allowance for the fact that the experienced drivers are in the majority and therefore more of them would be involved in accidents, but concludes that "the preponderance of mishaps caused by the more practiced persons has but one explanation and that is simply carelessness and a tendency to take chances. The lesson for motorists is plain—'never too old to learn'."

WHEELBARROW SANDER DUSTS SLIPPERY WALKS

Icy sidewalks are quickly and thoroughly coated with sand from a hopper spreader invented by an Iowa man. The attachment is fixed to an ordinary wheelbarrow which is filled with sand for replenishing the hopper and the flow of the material is regulated by a lever within easy reach. A pan with several strips on it effects even distribution.

Wheelbarrow Sander Attachment in Operation, and Side View Showing Connections

To Protect the Blind at Night; Flash of Light on Armband Identifies the Man in Darkness

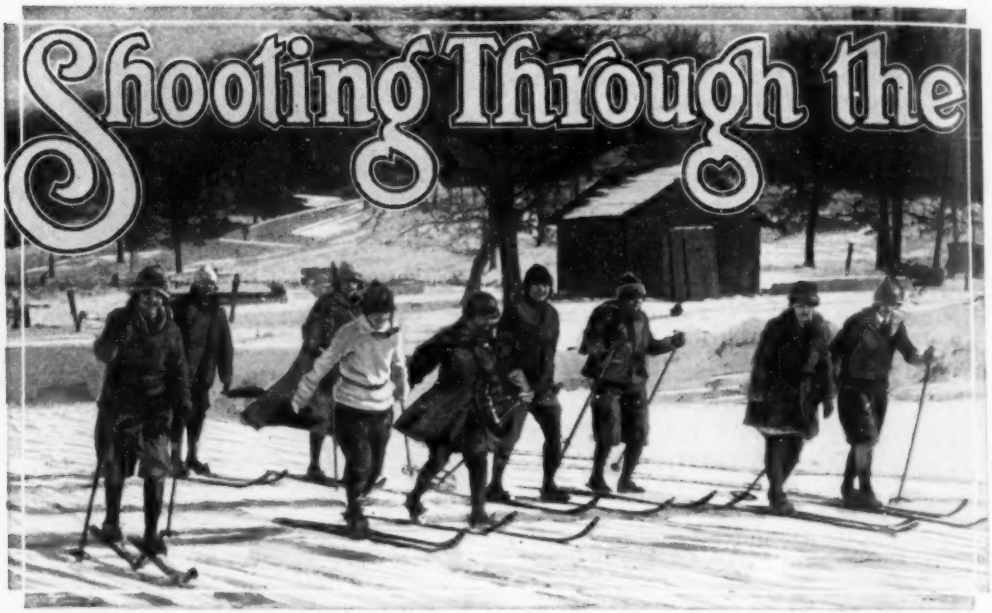
LIGHTED ARMBAND FOR BLIND GIVES NIGHT PROTECTION

Worn on the outside of the coat, an illuminated armband for blind persons serves as a signal when they desire assistance and also informs others of the wearer's condition, to prevent accidents. The band is lighted from a small electric battery and the current may be turned off or on whenever desired.

PHOTO TAKEN THROUGH EYE OF GLOWWORM

That insects can often see as well as human beings was demonstrated recently before the British Association for the Advancement of Science by Prof. H. Eltingham, who showed pictures taken with the eye of an insect used as the camera lens. One portrait of a man, which was good enough to stand enlarging and throwing on a magic-lantern screen, was taken through the eye of a glowworm, though its eyes are only one fifty-thousandth of a square millimeter in size. Dragonflies also can see as clearly as men, he said, while butterflies have eyes good enough to recognize each other at distances of more than a yard.

Shooting Through the



By EARLE W. GAGE

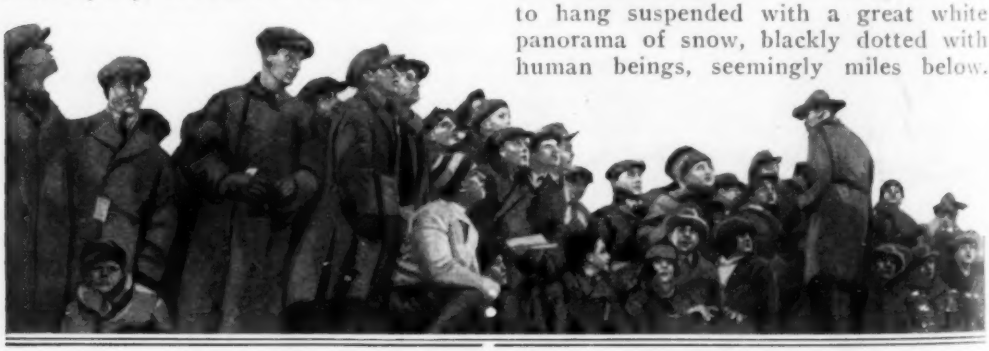
SKIING—flying through the air on a pair of wooden wings—that's the zenith of winter sports. "It's great sport—for the fellow who looks on," is the testimony of the conservative, but to the man who doesn't mind burying his nose in a ten-foot drift today, provided that he can take a ninety-foot leap into the blue air tomorrow, skiing is the king of all snow pastimes.

And if the thrills of plain skiing fail to register, why, there's ski jumping and ski kjoring. And it is most simple, safe and healthful sport, this sailing around the snow lands on a pair of wooden runners that seem to compete with the airplane for speed and thrills. It's easy to learn, and, anyway, the snow is soft!

For a moment you are poised at a giddy height, with two slender wooden runners attached to your feet. Then you let go and start gliding down the steep hillside pitched by nature at an angle of thirty or forty degrees. Faster, faster—yet faster you go until you are skimming along at airplane speed. This is rare exhilaration, flashing down the blue-white slope.

Then you come to the gentle acclivity, or take-off, which ends abruptly. Beyond that—nothing but just air. For the fraction of a second you experience a terrific upward rush as you clear the take-off that lifts you whistling through the air, hurling you for a hundred feet or more to the featherdown landing.

For the fraction of a minute you seem to hang suspended with a great white panorama of snow, blackly dotted with human beings, seemingly miles below.



Air on Wooden Wings

Then down, down you swoop like a frightened barn swallow. A single second more, and you have landed with an impact that fairly shakes your teeth loose, drives the breath from your lungs, and you are enveloped in a great cloud of swirling powdery snow. If you are not a professional, over and over you roll, since only the skillful are able to make the landing without a fall.

No pastime has so taken the New World as skiing. Its devotees have increased by leaps and bounds in the past few years, since Nels Nelson sailed from his white Norwegian hillside clear into the hearts of Americans on his trusty skis. Everything, from the wee hill for the greenhorn to the towering featherlike snowslide for the skilled, holds forth a challenge and an invitation to come and conquer.

This is the oldest known form of all winter sports. The "gliding Finns" let their neighbors, the Norwegians and the Swedes, copy their early models, but the idea went no farther for many years, and skiing seems to have been confined to the northern lands for centuries. The opening of the Middle Ages brought warfare and fierce battles, and armies were fitted with slender wooden runners and made able to travel in all kinds of weather.

Less than a generation ago skiing was confined to the Scandinavian countries and Russia. Early in the 90's, the French consul at Kolmar appeared in front of the Feldbergerhof, at Feldberg, Germany, with a pair of skis over his shoulder and orthodox Norwegian skiing took root in the Black forest. A little later Herr Zdarsky of Lilienfeld, Austria, invented a ski and a theory of skiing all his own, and thus attracted so much attention that special trains from Vienna started, carrying devotees of the sport into the country for winter holidays. Then Paulcke introduced skiing in Switzerland and created a sensation that still persists.

Although ski contests are held in America, all the way from Revelstoke, B. C., to old Vermont, it is in Switzerland that all kings of the sweeping wooden slippers meet to pull off the great International Championship ski jump, in the heart of the high Alps. Henry Hall, of Detroit, made the world's record jump at Revelstoke, 229 feet, which hasn't been beaten, but he has two brothers, Carl and Clarence, who are making it hot for him to keep that title. "Bing" Anderson, of Berlin, N. H., holds the eastern-states record of 172 feet, and is rated as one of the best jumpers in that part of the country.

The skis appear to be about the most awkward of footgear, but those who have mastered the strips tell us that they are about as playful as a pair of kittens. It is the custom, when donning them for the first time, to intrust yourself to the professional teacher who takes you out to some lonely slope, far away from maddening civilization, and advises you in falling to relax every muscle in your body and let yourself go; that only by making no attempt to save yourself will you be quite safe from straining a muscle. Not quite so easy as it sounds! After you have reached the stage where you can

Enjoying Thrills after a Hard Climb; a Skillful Ski Jumper Balancing Himself as He Swoops down a Snowy Alpine Slope

negotiate such little things as stone fences and tree stumps, it is time to learn the "Christiania swing," "stem turn," "Telemark turn," "herringboning," "swings," "stops," and a few other little tricks, all of which combined make a finished artist.

The knack of getting over the snow on these long runners is so easy to acquire, if the right principles are caught at first, that, at the end of a sunny afternoon's running, the ordinary person will be able to manage his skis fairly well.

The novice should start running wee slopes. The Telemark position is most popular with professionals, and is a good one to learn. One ski is held slightly in advance of the other, rear knee bent. Hold the skis closely together, and make but one track. Carry poles with points to the rear to avoid accident.

In climbing the hill, use the herringbone method, and you will be able to travel much faster than you could walk. Turn the points of the skis outward and tips of inside edges downward. One ski should be slightly above the other. The wider the angle formed by the two diverging skis, the firmer the grip. By lifting each ski in turn over the other, the runner can move straight up the slope as fast as his energy permits. Lean toward the hill and plant the skis firmly.

In climbing steep slopes, use the "traversing" method. Heading diagonally up the hill, lift the upper ski forward and upward, then bring the other up beside it.

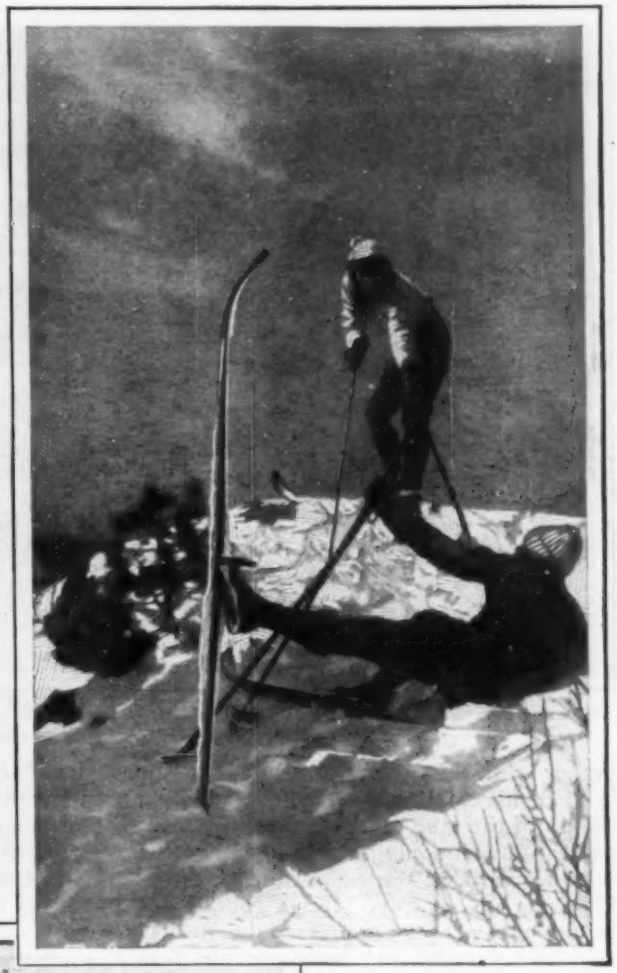
Complete control of skis means mastery of two methods of turning or swinging at full speed, either the Telemark or the Christiania. The first is usually found easiest in right-hand swings. The outer ski leads in making the right turn; to turn to left, the right ski is pushed forward until the foot is opposite the point of the left ski. Place weight on the forward ski, with body inclined forward and left knee bent deeply. Turn the right or leading ski inward, or "edge" it, and press sharply outward on right heel. The leading ski will swerve to the left, followed by the unweighted left ski. Continued pressure brings the skier to a full stop, facing uphill.

In the Christiania swing, the inner ski leads. Headed down the slope, advance the right ski slightly. When you wish to turn, shift the weight quickly to the right ski, edge it and twist sharply to the right, leaning toward the hill, somewhat in the

manner of making a sudden stop in skating. Put the pressure on the heel of the ski. This turn is valuable for a quick swing on snow too smooth or hard-packed for the Telemark.

The principal braking movements used to reduce speed on steep and uncertain descents are the "snowplow" and the Telemark. The first is done by placing the skis with points together and heels separated as far as possible. Both skis are edged inward, and the degree to which they are edged determines the braking effect. This leads to a turn, for, by shifting the weight to either ski, the skier is bound to follow that ski into a turn in the opposite direction. The right ski, being pointed inward, will run to the left if weighted; the other is sure to follow.

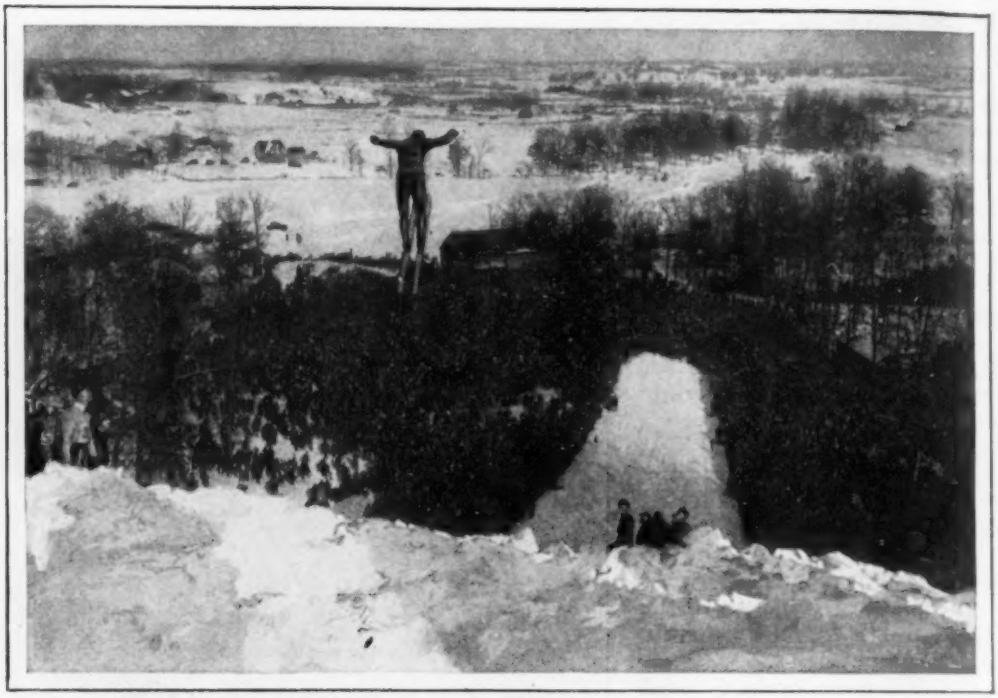
The Telemark brake is used for very steep slopes, and consists in placing one ski, edged inward, across in front of the other at right angles. The skier runs on the second ski with knee deeply bent and brakes himself with the first ski.



Summer Tourists in Estes Park, Enjoying the Ups and Downs of Skiing, and Below, Anthony Maurer, a Ski Champion, Coaching a Pupil

Jumping consists of two very important elements—spring and balance—each of which governs the form so prized by professionals. Judges rate form equally with distance in jumping contests.

Running in the Telemark position, the jumper bends quickly when a few yards from the take-off, pressing the knees firmly to-



Shooting from the Take-Off for a Long Jump toward Eager Spectators Below; a Scene at Cary, Ill., during a Meet Sponsored by the Norge Ski Club

gether with his hands extended at the level of his ankles. Just before reaching the lip of the take-off, he makes his "satz" or leap by snapping stiffly erect and a little forward, at the same time swinging his arms up sharply. Heels should not leave the skis, toes are pressed downward, skis held parallel and body inclined forward as the jumper takes to the air.

During flight, the skier should move his body constantly forward to conform to the angle of the slope below. In landing, the skis should be held together and the knees bent slightly. Upon feeling the snow, the jumper should push one ski ahead slightly, and run in the Telemark position, rising to an erect position as soon as his balance is assured.

Successful ski jumping calls for a fair degree of muscular co-ordination, joined with abundant spirit and nerve, and the many points which every skier will pick up only after exercise.

A spectacular pastime is ski kjoring. This is performed on a frozen lake covered with a few inches of snow. A trained horse fitted with a specially constructed light harness is driven by an expert skier, who stands a few feet behind. He holds the whiffletree with one hand and with the other guides the horse by the reins. Very exciting races are run, usually against time, which are as thrilling to the skier as to the spectators.

NERVE-RACKING NOISE ENDED WITH GUN SILENCER

Originally devised to muffle the explosions of firearms, the Maxim silencer has been adapted to oil-electric locomotives to help eliminate some of the nerve-racking din of peace-time industry. It is now in use on eight American railroads and is said to have been developed to such a high degree of efficiency that the noise of the exhaust may be heard only faintly within a dozen feet of the engine. The silencer was greatly modified for this service, and several months were required to adapt it. The attachment is on top of the locomotive and traps the exhaust in such a way that the energy of the sound waves is absorbed before they reach the outlet, but there is said to be no interference with the release of gases to the atmosphere.

CHEMICALS RAISE AUTO MILEAGE

Chemicals that hasten the curing process and improve the quality of rubber are among the laboratory's valuable contributions to motoring. One authority estimates that they are saving the American public $50,000,000 a year by reducing the time required to prepare the rubber, and have saved the manufacturers $80,000,000 additional capital investment. The increased mileage effected through this means is placed at 240,000,000,000 tire miles in the last ten years.

TRUCK CARRIES OIL DRUM UPRIGHT

An oil-drum truck that picks up and carries the containers without spilling the contents of open ones has recently been devised. Two movable flanges, curved to fit around the drum, move down and grip the container when the truck handle is raised, and lift it off the floor when the handle is depressed.

Truck for Hauling Drums of Oil or Other Liquids without Spilling; Movable Flanges Grip the Sides

© Herbert Photos

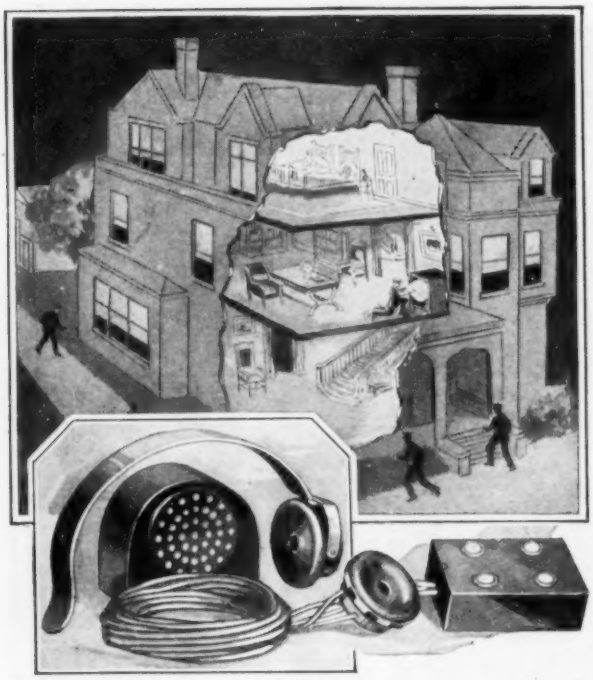
Mirrors Reflecting Vistas in Two Side Streets of the Three That Meet, to Aid Motorists and Traffic Policeman

MIRROR GUIDES AT CROSSING HELP PREVENT ACCIDENTS

Motorists approaching the intersection of three streets in Ashford, Eng., are able to observe traffic in the other two in large mirrors so adjusted that vehicles in either road are plainly reflected. This also lightens the task of the traffic police.

LAMPS WOUND UP LIKE CLOCKS TESTED FOR ARMY USE

Individual electric lights, supplied with a small spring-driven generator, have been tested by army officials as a substitute for the usual dry-battery flashlamps. Ten seconds of cranking is said to produce a bright light for three minutes.



Microphone, Headset and Switch of Listening Device That Locates Sound in Any Part of the House

MICROPHONE GUARD FOR HOME DETECTS THIEVES

For houses, factory grounds, farms or large buildings, a set of sensitive sound detectors, connected to a central listening unit, enables the proprietor or watchman to locate almost instantly any intrusion. Each microphone is incased in a pressed-steel receptacle and may be concealed about the rooms. Wires connect with a central key box. By pressing one button after another, the entire premises may be patrolled. In case of a burglar's visit, for instance, he could be located and every movement plainly detected even to footsteps on a carpeted floor, it is said.

WHITE ANTS MENACE WOOD IN BUILDINGS

White ants, or termites, annually cause enormous damage to buildings throughout the United States as the result of placing untreated wood in contact with the ground. A large Catholic church in Illinois was closed last year when it was discovered that four carved wooden pillars, supporting the roof, had been eaten out from the inside until a mere shell was left. Only the absence of heavy snows during the previous winter had prevented collapse of the roof. The ants can only enter and live in a building where wood which has not been treated is in contact with moist soil. If the sills are impregnated with creosote the ants will not gnaw their way in, while cement, brick or stone foundations under the sills offer even better protection. If present, the termites soon dry up and die.

AIR-VALVE GEAR SHIFT FOR MOTOR CARS

Auto gears are shifted by pressing a little attachment on the steering column instead of by the usual lever in an arrangement developed by eastern inventors. It utilizes suction from the motor intake manifold, creating a vacuum in two small cylinders attached to the top of the gear box. Air valves are so adjusted that the desired speed shift is made the instant the driver presses down the clutch pedal. Successful tests have been made with the installation on 600 cars of twenty-six makes, according to reports. It is said that the gears cannot be stripped when using this attachment.

Gears Are Shifted by a Valve on the Steering Column of This Automobile

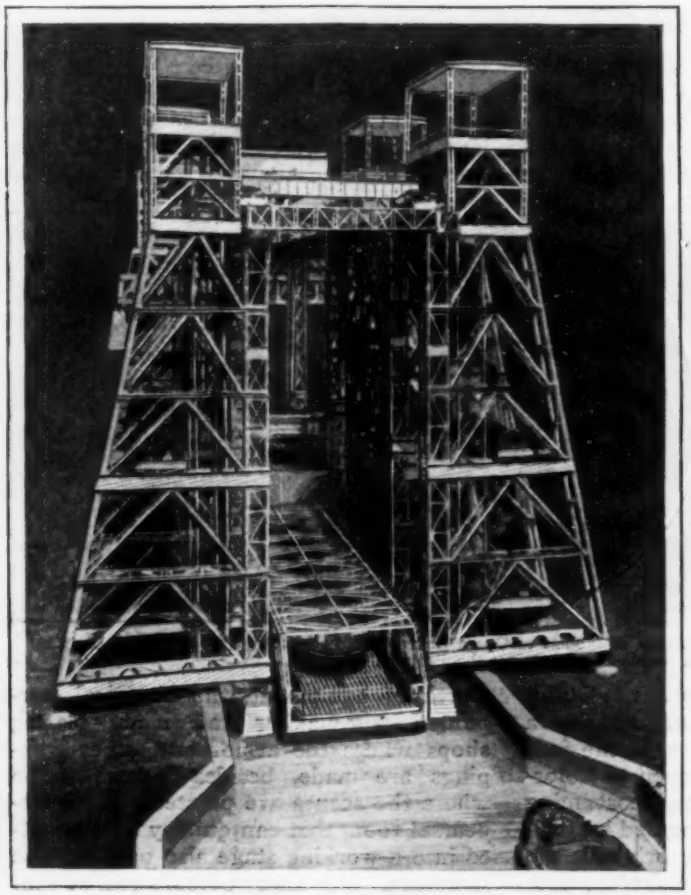
SMALL MODELS GROW INTO GRAND OPERA SCENES

Weeks before an audience witnesses a new performance of the Chicago Civic Opera company, the scenes have been critically inspected in miniature settings fashioned by Julian Dove, art director, in the company's huge studio and property building. Each model is constructed on a scale of a quarter of an inch to the foot and is complete in details even to coloring and the arrangement and costuming of the actors, who are represented by realistic little dolls. These tiny originals are the real beginnings of the elaborate productions on the big stage, for they serve as guides for the carpenters and other craftsmen who simply enlarge upon these first patterns. A miniature stage and its setting costs $200 or more, depending upon its character, so that $1,000 is not an unusual sum to pay for first casting an opera in these diminutive molds. The expense is considered justified because it saves later errors that would be far more costly to correct. Each model can be lighted so that the actual effect of the finished scene can be studied. In fashioning the sets, the artists must also keep in mind that the drops and other pieces will have to be moved quickly by scene shifters and that they must be collapsible so that they can be packed away when the company goes on tour. To hold the huge drop curtains and other equipment, the longest baggage cars in the country are pressed into service and the making up of a train for the opera requires a special call for cars from all over the country. No one railroad has enough of the long cars to carry all the property. Besides the collection of model stages, the studio building houses most of the company's $7,000,000 worth of equipment, the electrical, carpenter, wig-making and metal-plating shops where the armor and other trappings are made, besides a vast studio where the scenes are painted. A big rehearsal room that can quickly be converted into a working stage also occupies the structure. Not many persons realize that a small menagerie is a necessary part of the opera company's equipment. A meek and lowly donkey is a feature of "Pagliacci," geese are needed in "Koenigskinder" and a goat performs in "Dinorah."

Julian Dove and Some of the Hundreds of Models of Opera Scenes Which Are Prepared to Study Lighting and Scenic Effects Before the Props Are Painted

FIELD GLASSES AS SPECTACLES RELIEVE FATIGUE

Holding field glasses in position soon becomes tiresome and, to eliminate this, a pair has been made to be worn as spectacles with supports over the ears. They are adjustable to suit any user both as to focus and distance between the lenses.



Working Model of Boat Lift; Craft Is Floated upon Platform in Center and Raised or Lowered

STEEL CAGE FOR LIFTING BOATS SUBSTITUTE FOR LOCKS

One of the interesting exhibits shown at the recent exposition for shipping and water power in Germany was a design for an apparatus to be used on canals for lifting or lowering boats. It consisted chiefly of a cage supported by steel framework on either side of the channel. The boat is run upon the cage and transported through the air to the higher or lower portion of the canal.

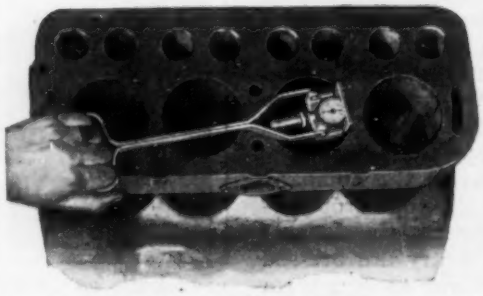
¶A species of Malayan bat has a wing spread of five feet.

ELEPHANT MARKET FEELS HIGH COST OF LIVING

A ton of elephant, f.o.b. Europe, is worth $3,000, according to recent figures made public by John Hagenbeck in an announcement detailing the rising cost of jungle giants. The price has advanced considerably in recent years, partly because of higher shipping charges and labor costs and partly because the elephants are wise to the lures of big-game hunters and avoid their pitfalls with more success than in the past. A one-ton elephant is not a large beast, and circuses, zoos and others who want larger animals pay proportionately higher prices.

CYLINDER GAUGE LESSENS COST OF REPAIRS

Guesswork is eliminated in determining the condition of motor cylinders with the aid of a recently marketed combination micrometer and gauge which reveals defects to an accuracy of one one-thousandth of an inch. It quickly shows if the cylinder is tapered or otherwise out of round and, after such variations have been determined, the diameter of the cylinder is found with the aid of the micrometer. Four adjustable rods supplied with each gauge, which is self-centering and non-collapsible, permit its use on diameters varying from two and five-eighths inches to six inches. Readings are registered on a dial.



Combination Cylinder Gauge and Micrometer in Working Position; the Handle Permits Easy Use

The Magic Lure of Numbers

By J. EARLE MILLER

Solution of the Puzzle of the Wise Men of Gotham

THERE is a story told about the "Wise Men of Gotham," who had a school with twenty-four pupils. They built a schoolhouse in the form of a hollow square, with eight classrooms surrounding a playground. In each of the eight rooms they placed three of the twenty-four pupils, and it was a simple matter then to check up and see that all the boys were studying, for the wise men had only to count and make sure there were nine boys in the three rooms on each side of the school.

But four of the pupils slipped out just after a check, and on the next round the wise men still found nine boys on each side! And then the four came back and brought four friends, and still there were nine on each side. Soon four more friends dropped in—and yet there were only nine on each side, though now there were actually thirty-two instead of twenty-four boys in the school.

With Fifteen Checkers, Can You Force an Opponent to Take the Last One by Drawing One, Two or Three?

Figures, some one once said, do not lie, but they apparently tell some pretty large untruths, as you can see when you examine the photographic solution of this puzzler.

There is no end to the marvels that can be performed with numbers, to the amusement and mystification of your friends. From the simple proof, by algebra, that two is equal to one, to an equally simple method of becoming a multimillionaire in one month by saving your money, you can furnish an entire evening of amusement.

The problem of getting rich in thirty days requires only that you save one cent the first day, two the second, four the third, and so on, doubling the amount each day during the month. The saving gets a bit hard toward the end of the thirty days — particularly on the thirtieth, when the amount to be saved will be more than $5,000,000—but your total wealth at the end of the month will be more than ten and three-quarter million dollars.

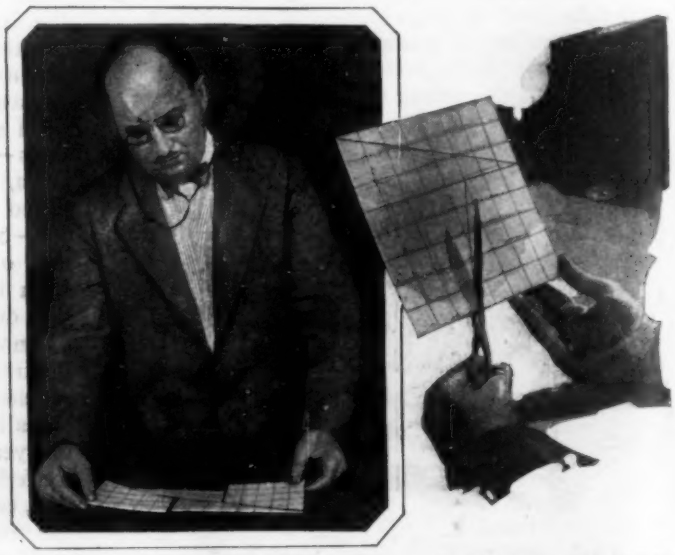
Another equally famous demonstration of the enormous totals reached by geometrical progressions is to ask for a position for one year, offering to work the first week for one cent, the second for two, the third for four, and so on for fifty-two weeks. Most any employer, who hasn't previously fallen for the same offer, would

Here Is a Rectangle of Paper Whose Apparent Surface Increases Several Square Inches as the Parts Are Moved

be willing to accept such a seemingly reasonable proposition. If he does, however, be sure and insist on a bond for the final week's salary, for your pay for that one week alone would be some 1,500 times the total of all the money in the world, while the grand total for the year would be more than 40,000 billion dollars. There is a simple method, by the way, of obtaining the total of a column of such progressions, without the bother of adding the long list of figures. Simply multiply the last number by two and subtract the first. For example, the progression, starting from 1, would be 2, 4, 8, 16, 32, 64, 128, etc. Adding the figures given makes a total of 255, whereas if you multiply the final number by 2, you get 256, and subtracting the first number gives 255, the actual total of the series.

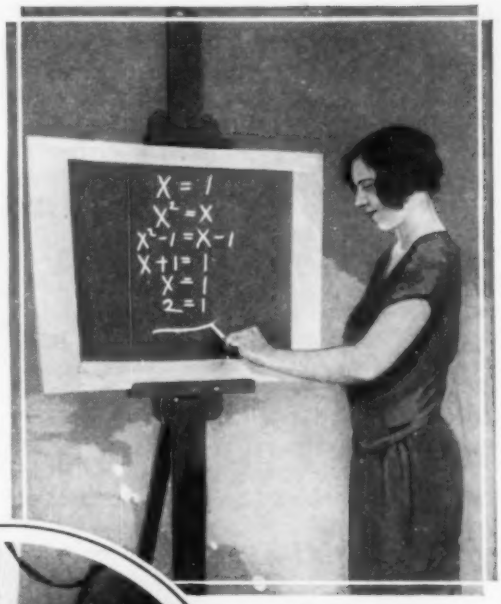
There are a number of interesting arithmetic puzzles. One can be performed with fifteen counters—checkers, poker chips, matches or any small articles that are available. Announce to a friend that you will each withdraw one, two or three at a time, and that you will force him to take the last counter. You start the game by withdrawing one or more—the number is not important; then your opponent does the same, and so on, alternating draws. The only thing necessary is to see that on your next to the last draw you leave five counters, then, no matter what he draws, you can take away enough the next time to leave only one.

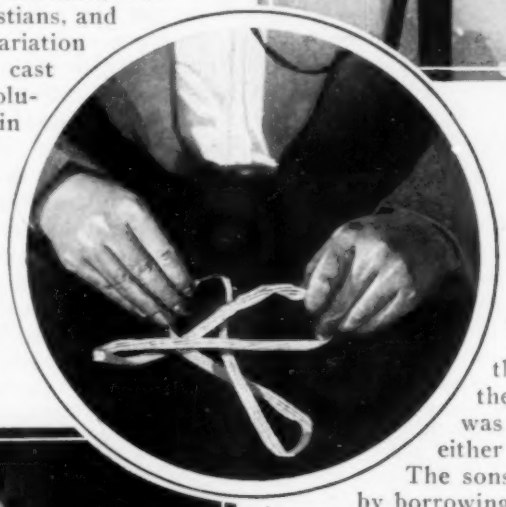
Another puzzle, which has several variations, is performed with thirty counters. The story connected with the puzzle is that there were fifteen Christians and



This Shows How to Cut a Square of Paper So That Sixty-Four Square Inches Can Be Rearranged to Cover a Space One Inch Larger

fifteen Turks on a ship at sea when a storm arose and the captain announced that half the passengers would have to be thrown overboard. It was agreed that all should form a ring and, starting from a designated spot, every ninth man should be cast into the sea. When the work was over it was found that the fifteen Christians were left and all the Turks had been counted out. The puzzle, and this is where the checkers come in, is to find in what order the thirty were placed. It can be determined by laying the thirty pieces in a ring, picking a starting point, and then counting to the ninth piece, marking it with a "T" for Turk, and so on until fifteen have been marked. The other fifteen will be the Christians. The solution will be found to be four Christians, five Turks, then two Christians, and so on. In another variation every tenth man was cast overboard, and the solution can be reached in the same way.





Above Is the Apparent Proof, by Algebra, That Two Equals One, While at the Left and Below Is an Interesting Trick Performed with Paper

The puzzle of the Arab, his three sons and his seventeen camels dates back in history as far as that of the thirty passengers at sea. According to the story, the Arab died and left a will stating the eldest son should have half his camels, the second son one-third and the third one-ninth — but the number seventeen was not divisible by either two, three or nine. The sons solved the problem by borrowing another camel from a neighbor. That made eighteen, and the eldest son took nine as his half, the next took six as his third, and the youngest took two as his ninth—a total of seventeen—and the borrowed camel was returned to the neighbor. The secret of the puzzle lies in the fact that one-half, one-third and one-ninth, when added make seventeen-eighteenths, instead of the whole of the father's wealth.

Mathematicians have been able to prove most of the problems submitted to them, but there is one for which no mathematical proof has ever been devised, and that is why a map maker need use but four colors to print his maps. The fact has been known for centuries, but no one has ever determined a method by which it could

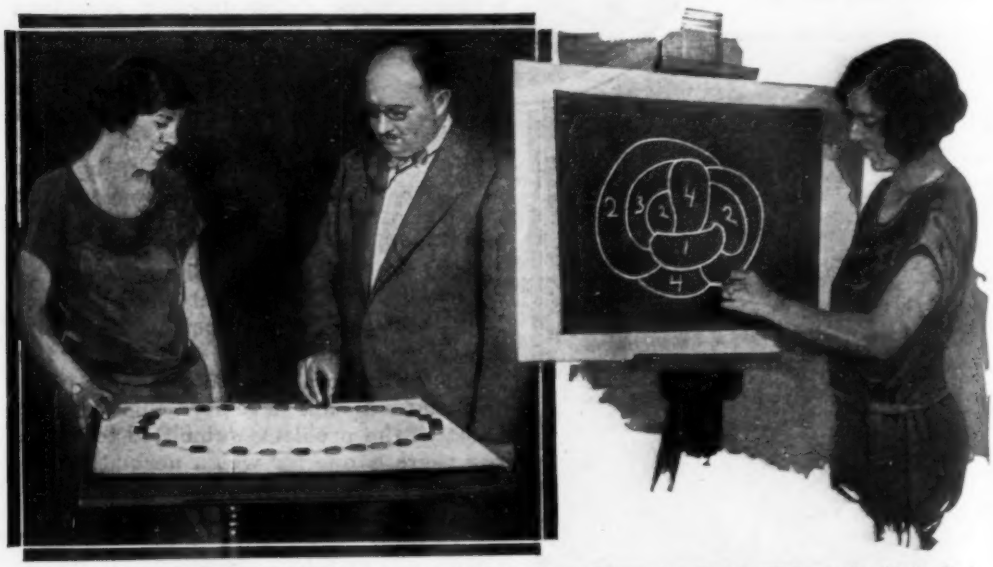
be proved. If you try drawing you will soon find that it is impossible to draw any figure of five districts each of which touches the other four, the only circumstance under which more than four colors would be necessary to mark the divisions.

While you are practicing drawing, there is an equally old catch problem that can be tried. The story with it is that a ship had a five-by-thirteen-inch hole in its bottom, and the only board the ship's carpenter could find with which to make repairs measured eight by eight inches. The hole was sixty-five square inches in area and the board only sixty-four, but the carpenter knew how to saw it up to add a square inch to its surface.

It seems impossible, but if you will lay out a square of eight units to a side—quarter or half inches will do as well as inches—and then cut it in four pieces you will find you can reassemble the parts in a five-by-thirteen-inch rectangle. Measure down three units from the top, and cut across on that line. Next draw a diagonal from corner to corner of this three-by-eight piece and cut it into two triangles. Now measure three units from the corner along the top of the larger piece, and three units from the opposite corner along the bottom edge, connect the two points with a line and cut. Finally reassemble the four pieces, as shown in one of the illustrations, and you have your sixty-five-unit rectangle made out of sixty-four square units of paper.

What actually happens, of course, is that the parts do not fit together, but the variation is so slight that it is almost unnoticeable.

Another equally interesting mathematical untruth can be told with a paper eleven by thirteen inches—or smaller units, if desired—in size. Draw a diagonal from one corner to the other, cut the paper into two triangles and lay them down, in their original position. Now shift the top one one unit up. The original paper contained 143 square inches, but you now have—apparently—a square twelve by twelve inches, plus two triangles, each of one half unit, or a total of 145 square inches. Shift the top triangle another unit, and you have a square of 143 inches, plus two whole and four half squares, or 147 square inches in all. Shift it another unit and you have a square—apparently—of ten by fourteen inches, plus six whole and six half squares—or a total of 149 square inches. By this time you will have discovered what is wrong—the original paper not being a square, the diagonal on which it was cut did not form a forty-five-degree angle, and so, after you have progressed a couple of squares you discover the lines don't match, and that your seem-



The Puzzle of the Turks and the Christians, at the Left, Is an Interesting Game, While at the Right Is a Sketch Showing Why the Map Makers Use Only Four Colors to Show All Countries

ing square is not a perfect one.

The old trick of finding a secret number, is one of the many puzzles of arithmetic that appear hard, but are really easy. Ask someone to fix on a number, tell him to double it, add four to that sum, multiply the whole by five, add twelve to that product, and multiply the whole by ten. Then have him deduct 320 from the final figure, and tell you the remainder, and immediately you tell him his original number. To get it you simply cut off the last two figures of the total he told you, and the number remaining is the one he started with.

Another puzzle with a mathematical twist can be performed with a strip of paper and a pair of shears. Cut a strip, say two inches wide, from the side of a sheet of paper and paste the ends together, first twisting the paper once, as shown in one of the illustrations. Then start cutting down the center of the strip, and ask someone, as you proceed, how many pieces of paper you will have at the finish. The natural answer would be two, but as a matter of fact, because of the twist, you will have but one. Then start cutting again and repeat the question. When you finish the cut you may be surprised yourself at the result, for there will be two rings, but linked together.

VALUE OF JUNK PILES IN U. S.

Since 1924, some 800,000 tons of waste has accumulated in the nation's junk heaps, according to an electrical expert, and this is worth about $200,000,000,000, not counting iron and steel. It is estimated that rust damages these metals to the amount of at least $300,000,000 a year.

Marine Flyer About to Take Off for Campaign against Mosquitoes; Poison Dusted over Swamps Proved Effective

AIRPLANE WAR ON MOSQUITOES WAGED BY MARINES

Noted for their skill in fighting, U. S. marines directed their energies at a lowly but formidable foe last summer, the mosquito. From specially equipped airplanes, mixtures of hydrated lime and Paris green were dusted over swamps around Quantico, Va., a marine base, to kill the insects at their breeding places. The work was done at a total cost of less than ten cents an acre, it was reported. The planes were marked with a devil design depicting a mosquito being put to death. Pilots wore gas masks to protect themselves against the poison dust.

¶ Chemicals to the value of about ninety-eight cents are contained in a man's body, it has been estimated.

BUILDINGS ARE SAWED IN TWO TO DRY MOISTURE

Motor-Driven Saw That Cuts Stone Buildings to Make Room for an Insulating Line against Dampness

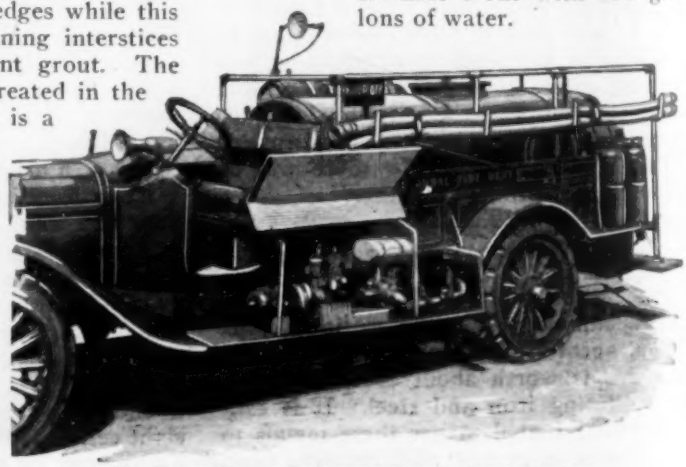
In order to save old stone or brick buildings threatened with ruin by dampness, a new method of drying them permanently has been developed in Germany. Use is made of a special electrically driven saw which can be set to cut the walls a suitable distance from the ground but below the flooring. The cuts are made at intervals of one and one-half to two feet. The slits, about one-half inch wide, are cleaned thoroughly and an "insulation plate" put in, the free-hanging part of the walls being supported by steel wedges while this is done. The still remaining interstices are filled with neat-cement grout. The rest of the wall is then treated in the same manner until there is a continuous layer all around the building which no dampness from the ground can penetrate. As in ordinary construction, the upper part is dried out by the usual means. Even mold is removed entirely by this method, it is reported. The success of the plan indicates that it will no longer be necessary to condemn old buildings that are beginning to fall apart largely because of moisture. The Holy Ghost church in Munich was saved by this means, as was an ancient hunting lodge not far from the city.

ICE-BOUND BALTIC SEA GRIPS FIFTEEN STEAMERS

Like many other sections, the northern part of Europe passed through an unusually severe winter last season. From October until late in the spring, extremely low temperatures prevailed over the Baltic and the gulfs of Bothnia and Finland were frozen over, taking on the appearance of polar regions. Varying winds broke the solid ice and formed the floes into hummocks of enormous size. At one time, some fifteen steamers bound for Leningrad, were firmly locked in the Gulf of Finland, and others were bound along the eastern shore of the Baltic, off Esthonia. An ice breaker had to open several channels to release the vessels.

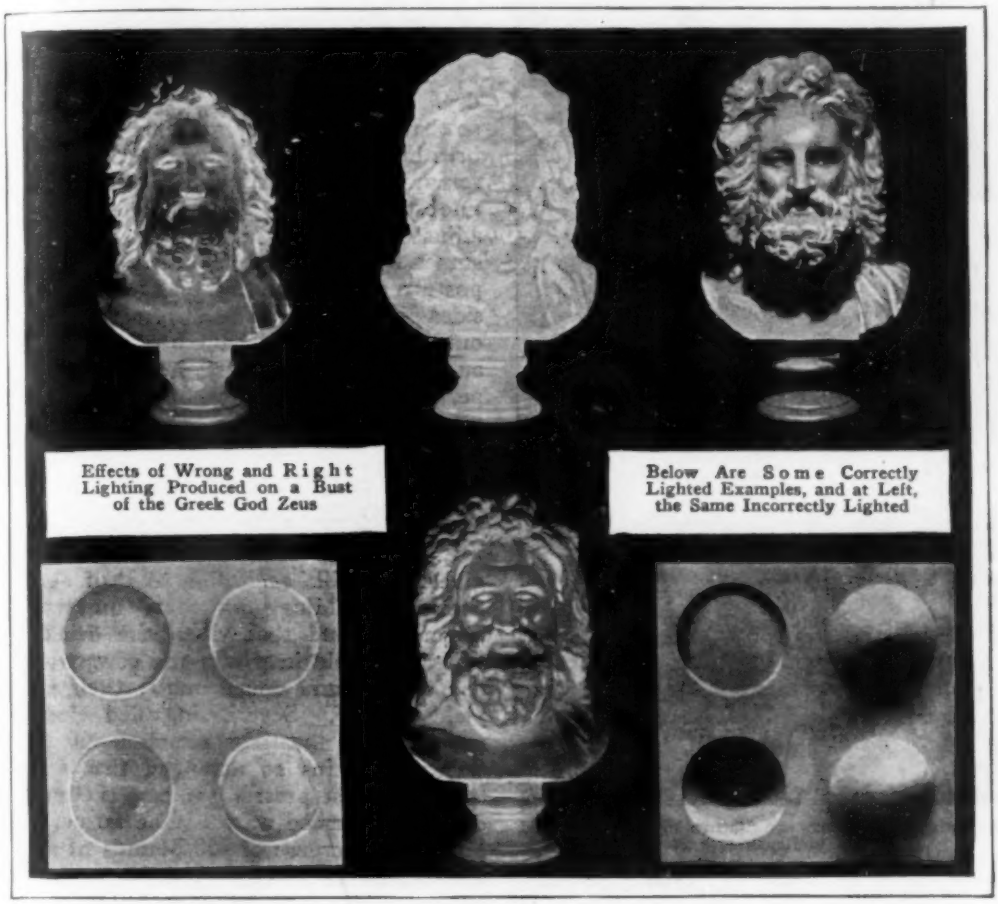
FIRE ENGINE WITH WATER TANK SERVES RURAL DISTRICT

The usefulness of a fire truck in a California city extends far beyond the area provided with hydrants and city mains, for it carries a large tank full of water in addition to pumping equipment. The idea was conceived by the fire chief as a means of protecting the country districts from grass and grain fires. On one occasion, the engine extinguished a blaze along a six-mile front with 250 gallons of water.



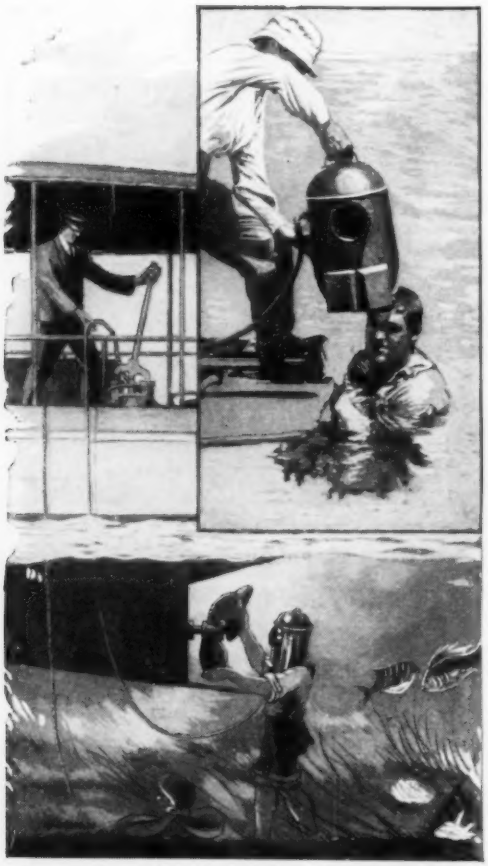
Fire Truck Used to Extinguish Fires in Rural Districts

SHADOW EFFECTS SHOW WAY TO PLACE LIGHTS



Correct placing of lights to bring out the best effects of your furniture and ornaments is being given considerable study by lighting engineers. The wide range of results that can be obtained by incorrectly and correctly placed lights is demonstrated by photographs of such deeply carved figures as the famous Zeus of Otricoli. With every moving of the light the camera records a different impression of the face. Strong glare lights cause it to lose detail; lighting from below puts shadows where they shouldn't be, with consequent alteration of the features, and cross lighting robs the bust of its best lines. Only when lighted at a certain angle from above do the shadows of the eyes, nose and beard fall naturally to bring out the beauty of the carving. A similar test can be made by photographing panels of recesses and projecting ornaments. Correct shadowing is necessary to bring out their shape, and when the lights and shadows are wrong, the camera, and the eye too, get an entirely erroneous impression.

Generally paintings, busts and other ornaments on the walls and mantelpiece appear to best advantage when lighted from in front and above. This is particularly true in paintings and sculpture where the artist worked by sunlight, since his shadow effects naturally follow those laid by the sun. If the artificial light is placed to duplicate the location of the sun you bring out the high lights and shadows the artist saw in the original. Busts and other objects placed on top of bookcases or mantelpieces and lighted from in front or below by floor lamps seldom appear to good advantage.



Adjusting the Helmet, and Illustrating How It Could Be Used in Repairing a Propeller

HELMET FOR SHALLOW DIVING AIDS IN SHIP REPAIRS

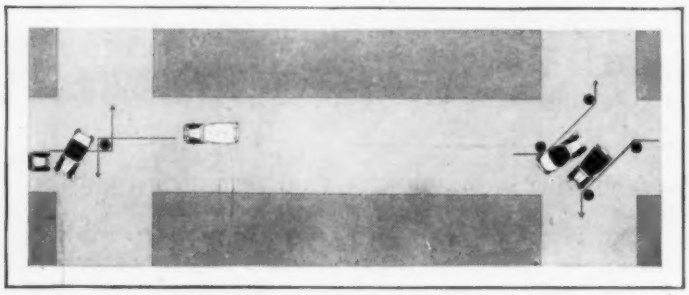
Explorations on the sea bottom to a depth of 100 feet are within the reach of amateur divers by means of a helmet and simple air-pump apparatus specially devised for emergency repairs on small ships. The headpiece is weighted, fits snugly but comfortably on the shoulders and can be removed while the person is under water, in case of accident. No suit is needed. As the air rushes in, it forces the water out of the helmet, keeping the head and neck dry. Vents permit the surplus to escape so that there is never too much air in the breathing compartment. There are two removable windows, permitting an almost unobstructed view. The helmet remains adjusted regardless of the position assumed by the wearer who can work in any posture except standing on his head. Besides proving of great aid to mariners, the outfit is reported to have become popular among pleasure seekers who desire to experience the sensations of diving and see the wonders of the submarine world.

ELECTRICITY COMPELS COWS TO GIVE MORE MILK

Electricity is being used to make cows give more milk, according to Prof. A. E. Stewart of Minnesota State university. Farmers found that when the drinking water was cold in winter the cows would drink little, and consequently their milk yield fell off. Several installed electric pumps with heating attachments, and water fountains so arranged that when the cow's nose pressed the cup, the pump delivered warmed water. One farmer reported an increase of 430 pounds of milk a week, giving him an extra $35 a month revenue. The installation cost $140 and in five months he made $175 from it.

TWO-PIVOT TURNS FOR AUTOS RELIEVE CONGESTION

Two pairs of turning points at street intersections instead of the customary single one in the center have been adopted in Los Angeles to reduce delays and confusion. They are said to have proved especially satisfactory when cars approaching each other are turned to the left. Neither driver has to wait for the other, consequently cars do not encumber the street center.



Advantages of the Double Turning Point Seen at Right

SIX HORSES DEFEAT ELEPHANT IN PULLING CONTEST

Eight Horses Pulling Almost as One during the Test, and "Old John," Powerful Circus Elephant, Demonstrating His Strength; He Was Defeated by a Six-Horse Team

Offending Motorists in Detroit Are Reprimanded from This Loud-Speaker Police Car So That Others Can Hear and Take Warning

LOUD SPEAKER ON POLICE AUTO AIDS SAFETY CAMPAIGN

"Lectures" given traffic violators in Detroit can be heard for a considerable distance through a loud speaker on a police automobile. The public reprimand broadcast in this manner is said to be effective both on autoists and pedestrians who are upbraided for jay walking.

STOPPER MAKES SIPHON BOTTLE AND PROTECTS CONTENTS

A stopper that keeps ginger ale and other charged drinks from becoming flat while awaiting use, and at the same time converts the containers into siphons, expelling the liquid under pressure, has been invented by a Chicago man. The siphonette, as it is called, consists of a rubber tube, inclosed in a metal case, equipped with a lever under spring tension to pinch the tube shut. The end of the handle is fitted with a bottle opener. With the stopper in place, only a slight shake of the bottle is necessary to generate sufficient carbonic acid gas to expel the contents with considerable force.

Besides Corking Charged Drinks This Stopper Also Makes a Siphon of the Bottle

OIL WELL DRILLED MILE AND A HALF

Surpassing all previous deep-well records, a shaft being sunk in California has passed the 8,000-foot level. The engineers plan to continue drilling so long as the drills, which are electrically driven, can be kept operating. Extremely high temperatures have been met below 7,000 feet. The well tapped an oil-bearing sand at 3,600 feet, and good oil and gas flow at 5,375 feet, while extremely heavy gas pressure was encountered at 5,480 feet. Oil was also found between 5,620 and 5,900 feet.

GROWING OF DWARFED TREES ENCOURAGED IN JAPAN

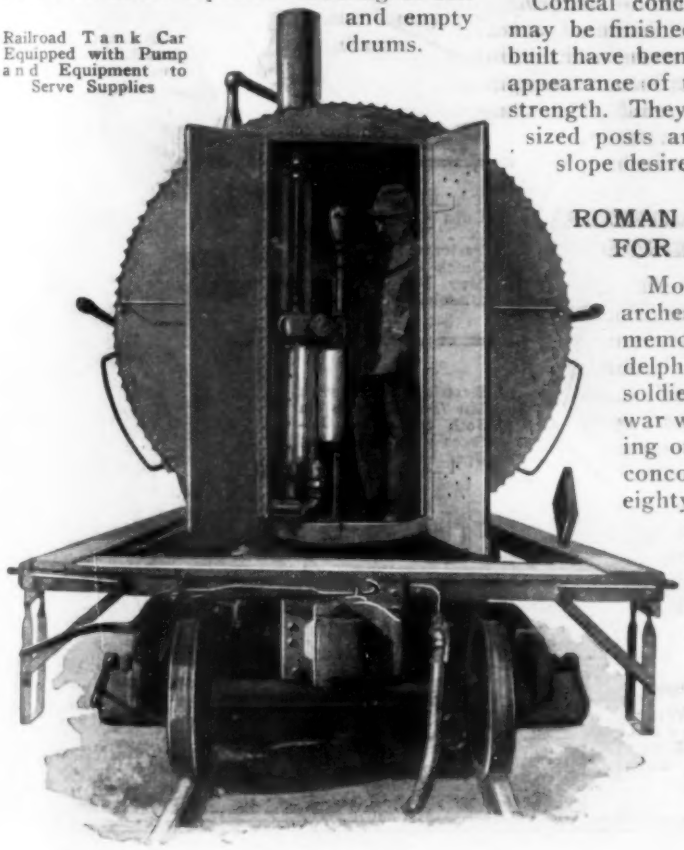
To keep alive the art of growing dwarfed trees, Japanese connoisseurs of flowerpot-size forests have formed a Dwarf Tree Encouragement society and begun holding annual exhibitions. Recently 300 of the finest examples in the islands were exhibited, including tiny pines with a pedigree showing them to be as much as 500 years old. One, of that age, is valued at 10,000 yen, or $5,000. The art is not confined just to dwarfing a tree, but includes the complete reproduction, in miniature, of a natural

scene, the composition being as carefully executed as a painting. A tiny tree, with a sprig of bamboo, a moss-covered rock and some blades of grass are brought together to recreate a scene that some artist of hundreds of years ago saw and admired. The outstanding piece of the exhibit was not even a tree, but simply a small piece of natural rock that happened to be formed in the image of Fujiyama, the sacred mountain of Japan. Though of no value in itself the little piece of stone was valued at 11,000 yen.

TANK CAR AS FILLING STATION SERVES RAILROAD

Gasoline is being distributed to storehouses and tanks along the lines of a western railroad from a traveling filling station, a specially equipped tank car. It has a capacity of 12,500 gallons, self-measuring pumps that deliver fifty-five gallons in three minutes, and hose lines and connections. It saves repeated handling of full and empty drums.

Railroad Tank Car Equipped with Pump and Equipment to Serve Supplies



Concrete Base for Fence Posts, Which Comes Ready-Made and Is Designed to Fit Any-Size Post

CONE-SHAPED BASES FOR POSTS IMPROVE LOOKS OF FENCE

Conical concrete bases for posts that may be finished even after the fence is built have been designed to improve the appearance of the barrier and add to its strength. They can be had to fit different-sized posts and to give any degree of slope desired.

ROMAN ART COPIED IN ARCH FOR AMERICAN TROOPS

Modeled after the triumphal arches of ancient Rome, a war memorial to be erected in Philadelphia in honor of the city's soldiers who died in the world war will be one of the outstanding ornaments of the city's new concourse. The arch will be eighty-two feet high and twenty feet deep, faced with limestone. The inscription surmounting it will read: "That the principle of liberty and justice might prevail, these dead have died. We, their survivors, feeling a deep sense of gratitude and loving sympathy, have by public subscription erected this arch to their eternal memory."

Time and Money for Your Home

Home Laundry in Compact Unit, Combining Washer and Drier; No Wringer Is Used, Moisture Being Removed by Centrifugal Force

One-Burner Steam Cooker Has Only Three Parts, with Glass Coating over Seamless Steel, and Preserves Flavors

Tea Enough for Six Cups Can Be Placed in This Hinged-Cap Perforated Spoon for Quick Brewing, or It May Be Used for Dissolving Chocolate

Electric Toaster with Lift Top Browns on Both Sides and Reduces Waste of Heat; Operates from Lighting Socket

Revolving Whipper for Cream, Butter or Eggs Fits inside Glass Fruit Jar

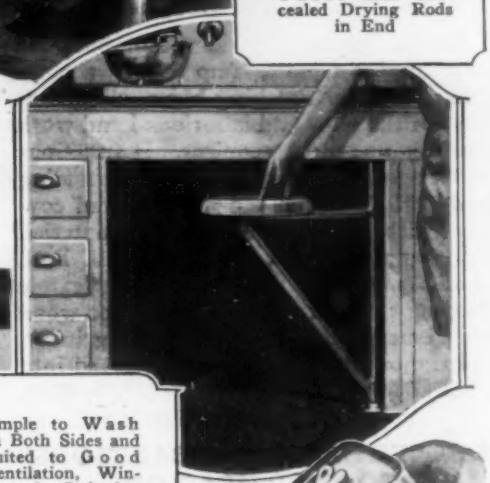
Anyone wishing further information on devices described in the editorial pages can

Saving Things

Wringing the Mop by Twirling It; End Fits into Corrugated Double Cone in Pail

Electric Ironer on Casters Also Has Table with Concealed Drying Rods in End

Easily Attached to Sink Stand or Table, Pivot Stool Lightens the Housewife's Task and Saves Space

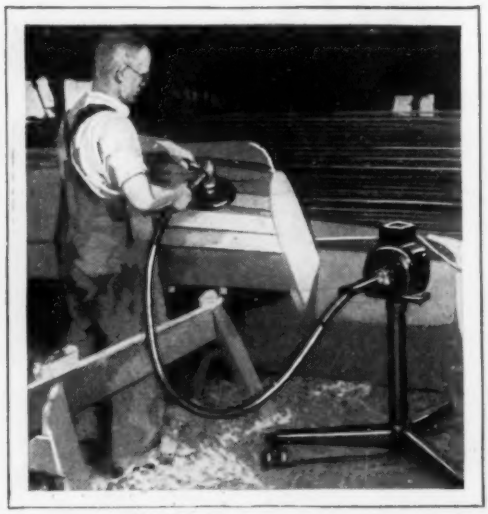


Simple to Wash on Both Sides and Suited to Good Ventilation, Windows in Swinging Casements Ease Task of Cleaning

Can Opener with Spout for Pouring Liquids

obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago

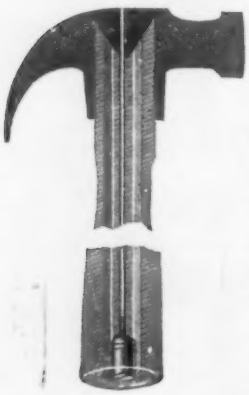
PORTABLE SANDER FOR BOATS SAVES BUILDERS' TIME



This Portable Electric Sander, Designed Primarily for Finishing Boats, May Be Put to Other Uses

Driven by an electric motor supplied with current from a lamp socket, a portable sander for finishing boats, eliminates most of the slow and laborious hand work that this operation requires. It functions on flat or irregular surfaces, a sanding drum, which is inflated with air and covered with a band of abrasive material, reaching almost all parts of the hull. Drill chucks may be attached to the flexible shafting for boring holes in steel or wood or an emery wheel fitted to form a grinder, and the outfit also may be converted into a buffer for polishing.

HAMMER HAS STEEL "BACKBONE" TO KEEP HEAD ON

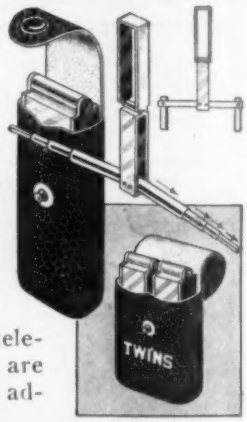


Hammer head and handle are said to be bound together as an almost indestructible unit by means of a steel tie-rod or "backbone" running the full length of the grip. The handle is formed from two pieces of white hickory, double-dovetailed together with the grain opposed and set with waterproof glue, which resists great strain. The rod will also balance the handle better.

WHEN PEOPLE MARRY IS SHOWN BY JEWELRY SURVEY

June weddings have been cut in half in the last quarter of a century, according to a marriage survey made in many cities by a wholesale jeweler trying to plot a wedding curve as a guide in stocking up with wedding presents. Formerly about one-fourth of all weddings occurred during the month of roses, but now the total has dropped to twelve per cent. September is second with 9.6 per cent, while November, because of Thanksgiving, and December, with the Christmas holidays, are tied for third place, with 9.3 per cent. April is at the bottom of the list, with only 7.5 per cent of the marriages.

GARMENT HANGER FOLDS UP INTO CASE FOR POCKET



Hangers for coats and trousers are being manufactured of collapsible rods that fold into a small leather case for the traveling bag or pocket. They are constructed of rustproof metal, will support considerable weight and, because of the telescoping feature, are easily and quickly adjusted for service.

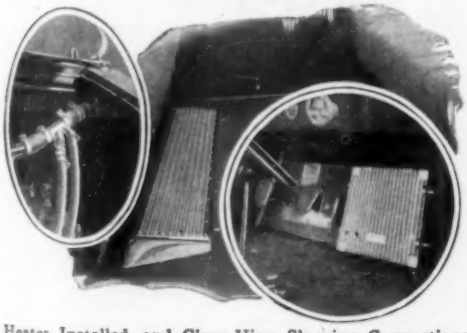
ACCIDENT SOLVES PROBLEM OF HIGH-SPEED CABLE

Behind the landing recently of the new high-speed cable to Europe lies the story of a scientific accident—a chance discovery that made possible the commercial use of permalloy, the new metal sheath which solved the electrical problems of fast transmission of dots and dashes under the sea. The electrical engineers who were experimenting with the new material were unable to weld it, and welding was one of

the processes necessary if it was to be used. All kinds of flux and all sorts of heating periods were tried without success. Finally, after a sample had been heated and sprinkled with borax, a workman casually picked up a salt cellar left standing near by after lunch and idly started to sprinkle salt over the borax. The top flew off the cellar, covering the sample with salt, and the engineers were amazed to see it combine with the borax and form a jellylike covering which prevented air from reaching the weld, to form the cracks that had ruined all the previous experiments.

HOT-WATER AUTO HEATER

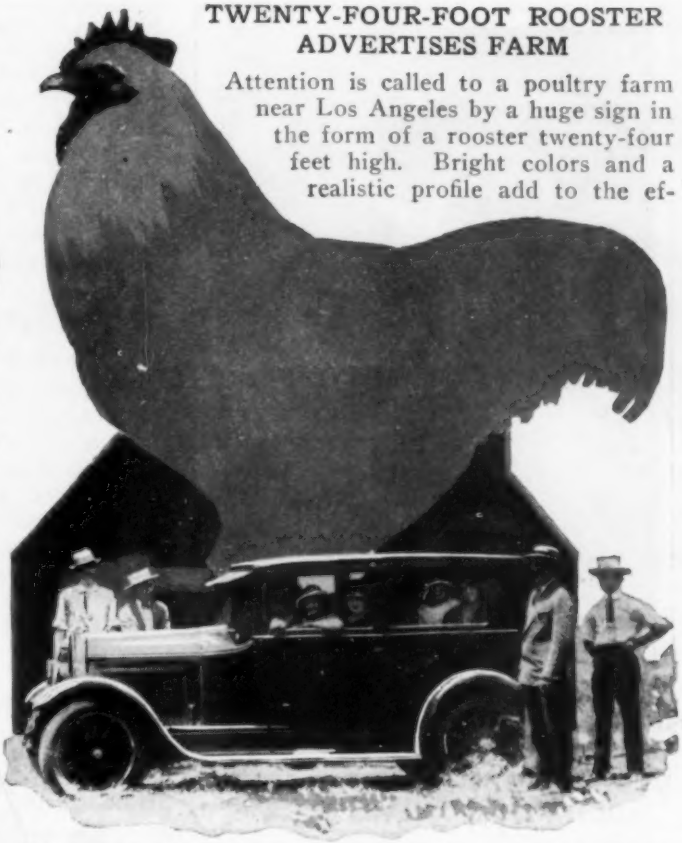
Clean, safe and odorless heat is provided for the automobile without the hazard of carbon-monoxide gas from an easily installed attachment operating somewhat like a hot-water plant for homes. It uses water from the motor's radiator and is put on with a special connection that requires only two holes to be bored through the floorboards and no cutting of other fittings. Water is kept circulating continuously through the heater by the action of the pump. The outfit is manufactured in two sizes, for the floor or footboard.



Heater Installed, and Close View Showing Connections to the Radiator Water Supply

TWENTY-FOUR-FOOT ROOSTER ADVERTISES FARM

Attention is called to a poultry farm near Los Angeles by a huge sign in the form of a rooster twenty-four feet high. Bright colors and a realistic profile add to the effectiveness of the marker, which has proved a good investment for the farmer.



This Giant Red Rooster Forms an Effective Sign for a Western Poultry Farm, as It Stands Twenty-Four Feet High

PARACHUTES TO LAND MAIL ON NON-STOP FLIGHTS

Wayside stations where air-mail ships can drop bags without the necessity of landing are to be introduced on airways in Europe. Experiments with small parachutes have shown that the mail bags can be dropped 5,000 feet without damage to the contents. The details of the device have been kept secret, but it is understood to embrace a clockwork arrangement by which the bags can be dropped like a plummet until within a short distance from the ground, when the parachute opens and checks the descent. The long drop before the chute opens enables the pilot to aim the bag at the landing field, and keeps it from drifting several miles away before the wind.

Safety Straps of White against Dark Uniforms Used to Protect Street-Railway Employes from Motorists

BELT GUARDS STREET WORKER AGAINST MOTOR ACCIDENTS

Street-car company employes of an eastern city, who must spend much of their time on the tracks, are distinguished by broad white cross belts so that they can easily be seen by motorists. The straps are visible on dark days or at night as they stand out in sharp contrast to the workers' dull-colored clothing.

PHILIPPINE MAHOGANY UNDER BAN

Orders barring the use of the term "Philippine mahogany" were issued recently by the Federal Trade commission against three lumber companies which had been importing the wood from the islands for use in furniture making, and other industries where a substitute for real mahogany could be employed. The board ruled that the wood did not belong to the same family as true mahogany, that it was much more porous than the genuine lumber, and that the practice of passing it off as mahogany by filling the pores was unfair. The filling later shrinks into the pores and the appearance of the wood deteriorates with age instead of improving, which is one of the characteristics of true mahogany that makes it particularly valuable.

TRUCK WITH "UPSTAIRS" DRIVE AIDS LIGHTING REPAIRS

Included in the automobile fleet of an eastern power company is a tower wagon with a dual-control arrangement to simplify work on street lights and poles. It has an extension steering post reaching to a seat on the upper platform from which a second wheel and controls to operate the electric truck are manipulated. With this outfit, when the workman has finished at one pole, he has only to step down a short distance to the upper driving seat. He can thus do the driving and the repair work also, saving an extra man. When the truck is to go long distances, the usual driving position is maintained. The tower is telescoping and can be raised to a maximum height of seventeen feet eight inches.

The Upstairs Drive on This Public-Service Truck Enables the Lineman to Make Repairs and Drive On without Climbing Up and Down Every Time He Finds It Necessary to Shift Position

Dazzling Spectacles of Nature for Which We Pay Millions Every Winter in Damage to Wires and Stoppage of Communication

By CALVIN FRAZER

A SPECTACULAR product of Hollywood may extract millions of dollars from American pocketbooks, but the mulcting process is generally spread over two or three years and the audience is nation-wide. Nature now and then taxes us just as much for a show that lasts but one or a few days and is seen only in a limited section of the country.

Ice storms occur when, with the temperature of the air at the earth's surface below the freezing point, rain falls from warmer air aloft. The drops turn to ice on striking the chilled surface of terrestrial objects, and continued rainfall steadily increases the accumulation. The typical deposit is clear ice, though it is sometimes mixed with previous deposits of ordinary snow.

Many ice storms do no damage. It is only when the ice coating becomes heavy enough to break the branches of trees and the wires and poles of telephone, telegraph and power systems that Nature begins to pile up a bill for her services as a scenic artist. Transmission lines are usually designed to carry a deposit of half an inch of ice on the wires in calm weather, though with high winds a considerably lighter load is destructive. Roughly speaking, only about one-third of the ice storms occurring in the northeastern United States reach the danger point of ice and wind.

Of the wire services the telephone companies are the greatest sufferers, as their overhead wires greatly exceed in mileage those of the telegraph and light-and-power companies combined. Heavy losses from ice storms are expected every winter, and in order to ease the strain on a company's resources they are met from a special reserve fund accumulated through the year and charged monthly to operating expenses. A single storm a few years ago entailed an outlay of $7,500,000 for repairs and reconstruction.

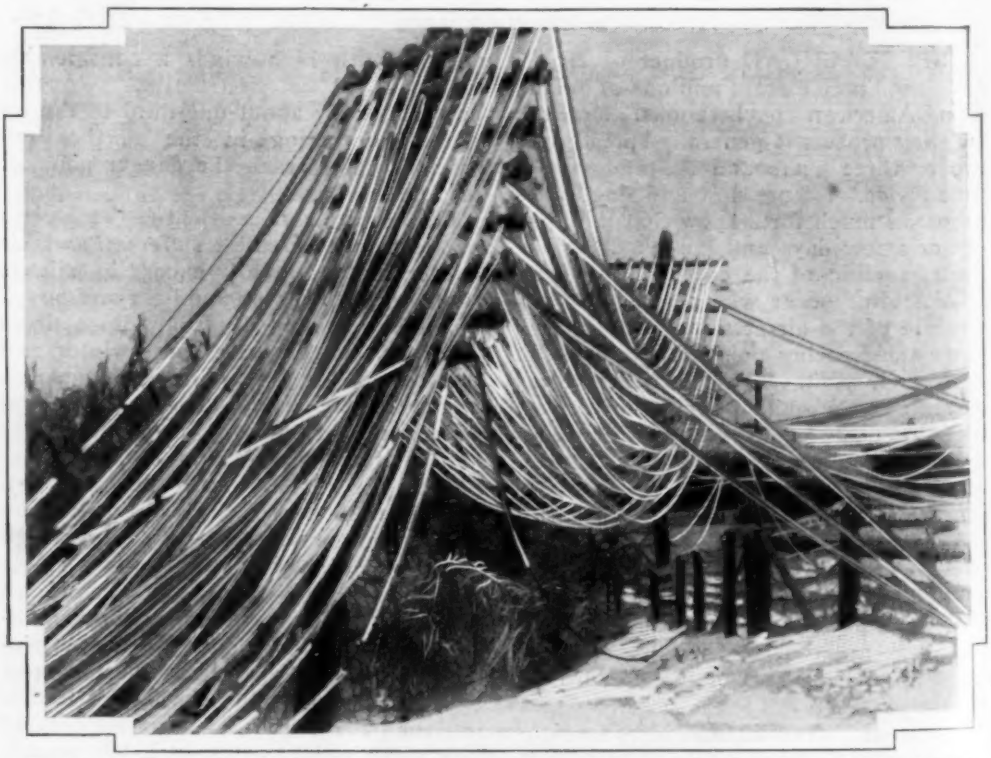
In the course of a few hours a single telephone wire may acquire a solid ice coating three inches in diameter and accompanied by even longer icicles. Whereas the weight of wires in the normal span between two poles in a forty-wire lead is less than 200 pounds, such an ice coating may add a weight of about 15,000 pounds to the load supported by each pole. If a

heavy gale is blowing, the pole is further subjected to a bending force due to the wind pressure on the ice-covered wires. Exposed to such stresses, the lines frequently fail, and even if they do not from this cause, they are often brought down by trees falling across the span.

Damage to trees sometimes constitutes a heavy item of loss in an ice storm. In February, 1922, the worst of these storms that has ever visited Michigan destroyed hundreds of thousands of trees in that state. Many fine orchards lost from fifty to seventy-five per cent of their trees. The deposit of ice was enormous. At one place a twig weighing only an ounce was found to be coated with two pounds of ice. Another, the size of a lead pencil, supported an ice column nine inches in circumference. In the great New England ice storm of Nov. 25-29, 1921, the city of Worcester, Mass., alone lost 8,000 shade trees. In this storm it was estimated that a tree fifty feet high, with an average width of twenty feet, carried a load of five tons of ice. In the New England woods, after the storm, the trees lay prostrate in windrows.

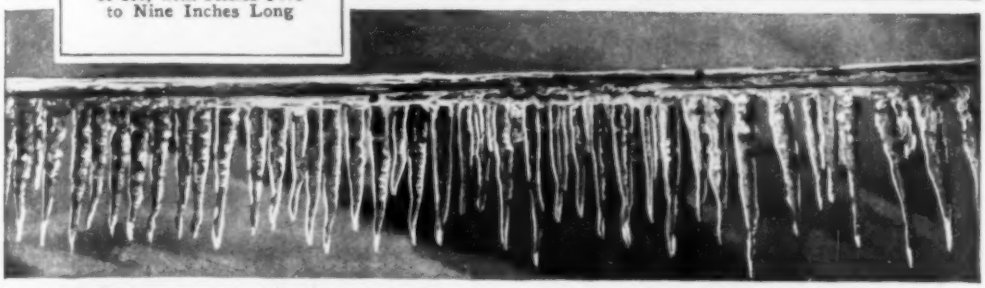
In December, 1924, one of the most disastrous ice storms in American history tore down 34,000 poles of the utility companies in Missouri, Oklahoma and Texas, putting out of service more than 25,000 miles of open wire. The focus of destruction was St. Louis, which, on the morning of the nineteenth, found itself almost totally cut off from the rest of the world. With wires and cables prostrate, or grounded by tons of ice, long-distance communication whether by telephone or telegraph was practically impossible. Every line leading west was partially or totally crippled. Ten thousand city telephones were out of order, while almost every station in St. Louis county was dead.

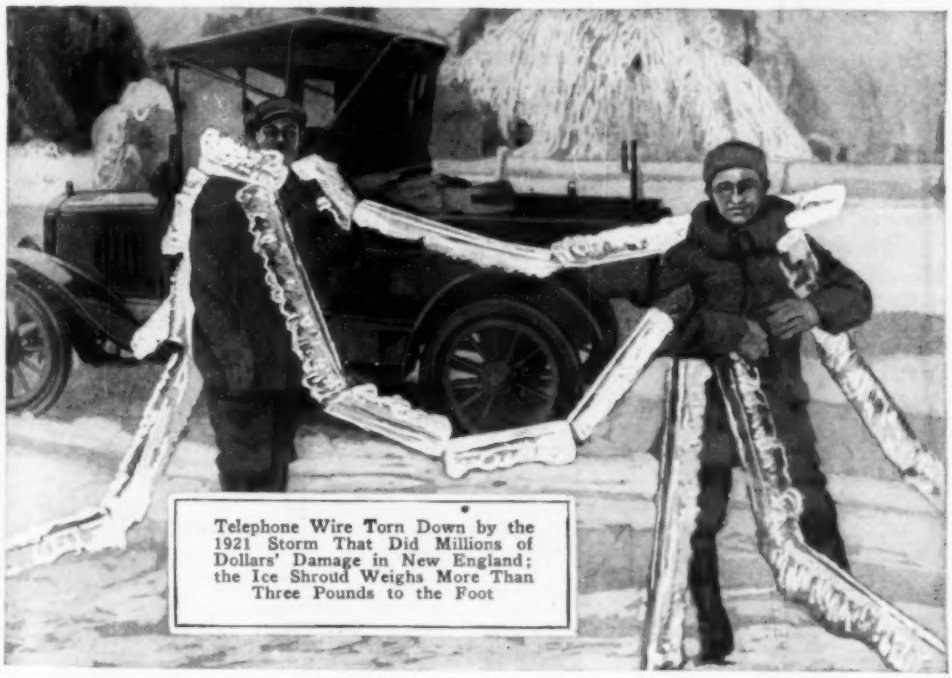
In an emergency of this kind, a veritable army of repairmen must be mobilized. The telephone company drafted linemen and foremen from surrounding states, and for weeks following the storm 3,000 men were at work in eastern Missouri alone.



The Greatest Enemy of the Telephone Lineman; the Ice Coat on Each Wire Is Three Inches in Diameter and Weighs Eighty Pounds per Wire between the Poles

The Results of a Glaze Storm, a Garden Completely Wrecked by the Weight of Ice That Broke Limbs from the Trees; and, Below, a Sample of Telephone Wire Torn Down by an Ice Storm; the Wire Is Inclosed in Two Inches of Ice, with Icicles Five to Nine Inches Long





Telephone Wire Torn Down by the 1921 Storm That Did Millions of Dollars' Damage in New England; the Ice Shroud Weighs More Than Three Pounds to the Foot

Radio-Operated Fog Signal Requires No Attendant; Impulses from Distant Station Start and Stop It

RADIO OPERATES FOG SIGNAL TO GUARD SHIPPING

Radio impulses sent from a transmitter more than eleven miles away operate a fog signal at the entrance to the Firth of Clyde, Scotland, saving a special attendant. The alarm is stopped by the same means, impulses of a different frequency actuating the mechanism that shuts off the signal.

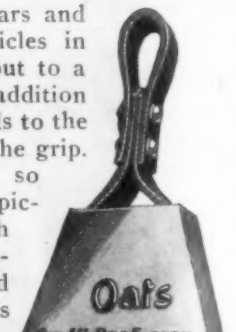
WRENCH WITH SPRING ON JAW IS SELF-ADJUSTING

With a stiff spring on the back, which throws the upper jaw in place automatically, a self-adjusting wrench affords powerful leverage and locks more tightly as pressure on the handle is increased. It is made of steel.

PLAINS ONCE FOREST-COVERED FOSSIL NUTS INDICATE

Dense forests of a species of walnut tree grew on what are now the open plains and sand drifts of western Nebraska, in the opinion of scholars who have studied collections of fossil nuts found in that region. They were discovered along with remains of prehistoric animals and were first believed to be hickory nuts, but comparison with all existing species of the hickory and walnut led to the conclusion that they were more closely related to the latter. From these fossils, it is held probable that the climate of the region was very different from present conditions, for the trees demand much rainfall and a deep, rich soil. The abundance and character of the associated animal life, as shown by other fossils, indicate that the forests were not confined to narrow areas along the banks of watercourses but that they covered considerable space, the investigators believe.

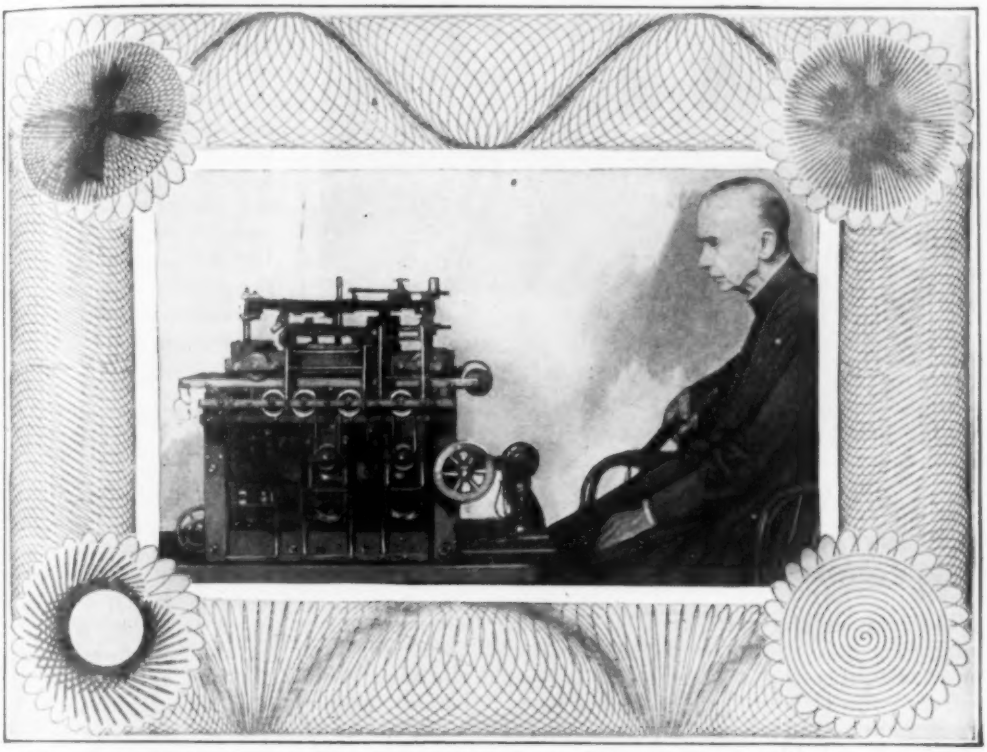
STREET-CAR STRAPS CARRY ADS TO INCREASE REVENUE



Straps in street cars and other public vehicles in London are being put to a double use by the addition of small display cards to the portion just above the grip. Advertisements so placed are in a conspicuous position both to seated and standing passengers, and the plan affords room for several more placards than can be accommodated on the regular side panels above, thus affording more revenue.

¶The Popular Mechanics Bureau of Information offers its free service to all readers of this magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished by addressing the Bureau.

MACHINE IS MADE TO DRAW BILLIONS OF CURVES



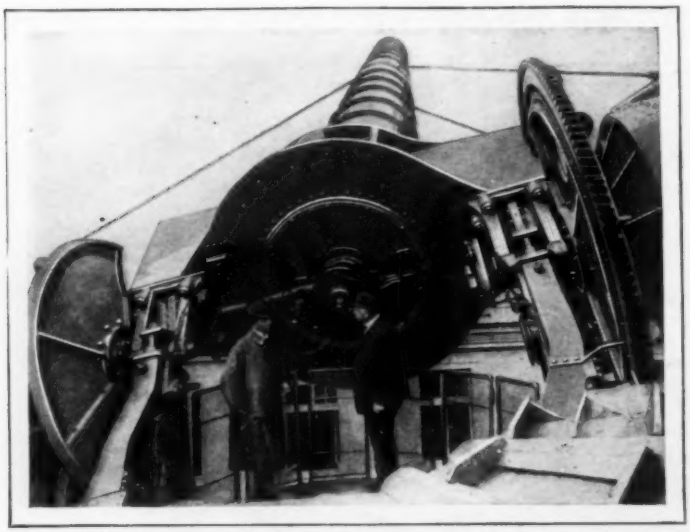
Father Rigge with His Curve-Drawing Apparatus; the Border Shows Samples of Some of the Billions of Curves That Can Be Traced with the Outfit

From simple parts which he purchased at small cost, the Rev. William F. Rigge, of Creighton university, internationally known astronomer, has fashioned a remarkable drawing instrument in connection with his study of the stars and of mathematics. Only a few adjustments are necessary to have the apparatus trace 7,618,782,498 curves. All are made with exceeding accuracy and the variety of design not only illustrates the scientific features of curved lines, but their beauty as well. The work is done chiefly by the action of a series of geared wheels. The paper is made to move under the pen, and, by setting the instrument properly, pairs of curves are traced in stereoscopic effect so that the finished pattern seems to have three dimensions, like a wire basket for instance, standing out distinctly in space.

GIANT WRENCHES ARE BUILT FOR CRANE

Big Wrenches Built for Electric Crane

Special wrenches were necessary in assembling a huge electric crane used in constructing the buildings at the new Wilbur Wright flying field, being established near Dayton as the home of the air-service engineering division. One of the big wrenches weighed over 150 pounds.



This Is the Observer's End of a German Telescope More Than Sixty Feet Long and Shows the Tremendous Gearing Used

SIXTY-EIGHT-FOOT TELESCOPE ASTRONOMERS' "BIG BERTHA"

Pointing at the stars from a German observatory in Berlin, a telescope tube more than sixty-eight feet long is helping astronomers solve the riddles of the skies. It is mounted on a special gearing for quick and accurate adjustments.

SHIFTING OF NORTHERN LIGHTS BLOCKS RADIO RECEPTION

The mere presence of northern lights does not interfere with radio reception, according to Paul Magee, chief operator on the arctic exploration schooner "Bowdoin," but when they jump about, changing their altitude and position, the effect is to completely shut off the signals. This result was noticed during the 4,000-mile journey through northern waters on the MacMillan expedition. At one place, an aerial was stretched between two rocky cliffs more than 100 feet high, affording a much better position than was available on the schooner. At that location, the lights were in a band of maximum frequency and brilliancy. After working for several hours, the explorers proved to their own satisfaction that the lights did not affect the reception of signals from the United States. But as the light cone ascended or declined in the sky, the signals were cut off.

SCIENTISTS STUDY STREET-CAR NOISE

Certain types of gears and speed and open windows contribute to unpleasant noises in street cars, while insulated wheels, flooring in one piece and rubber cushions under the center plates help reduce them, investigators at the university of Wisconsin have found. It was determined that leaving the windows open increases the noise about thirty-three per cent in cars running at the same speed over the same track, and that insulation caused a reduction in noise of about twenty to twenty-five per cent at twenty miles an hour.

Distributing Ice-Cream Sandwiches from Portable Cabinet; the Confection Is Protected from Dust

ICE-CREAM SANDWICH CARRIER KEEPS GOODS CLEAN

For dispensing ice-cream sandwiches, a carrier that holds a quart of cream, sufficient ice to keep it hard and a number of wafers, protects the contents from dirt and saves time in distributing. The holder, filled, weighs but eighteen pounds, is simple to operate and is not likely to get out of order.

How to Build a Portable Tube Booster

By L. B. ROBBINS

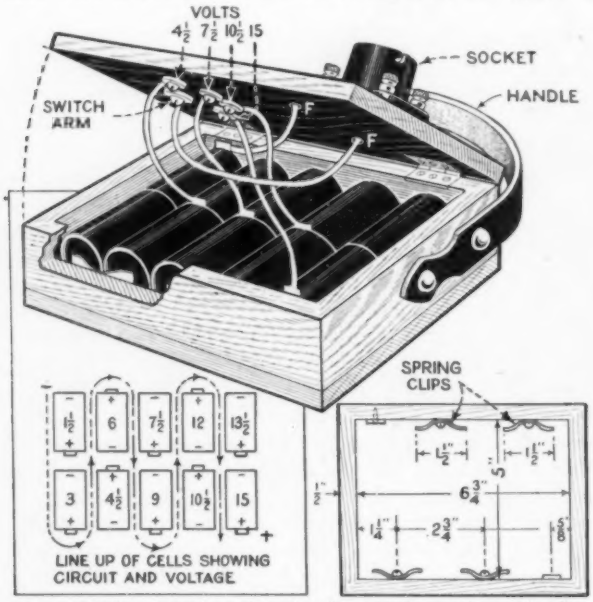
AFTER the apparent death of seven UV-199 tubes, I began to look around for some means of reviving them for further use. Rejuvenators of various types are on the market, but all require a 110-volt lighting circuit and this was not available.

The problem was solved at small expense by the simple apparatus described in this article. It operates from ten flashlight cells, may be easily carried in the hand or slipped into an overcoat pocket and will restore to efficiency a tube of either the 199 or the 201-A type. Tubes with shorted grids and filaments, of course, are beyond recall, but where they have lost their original "pep" they may be restored to usefulness in a short time. The instrument is provided with a standard socket and adapter so that either the large or small tubes may be handled; if the tubes are of the new X-type, the X socket should be used. Make sure that your tubes are of the type that may be rejuvenated, because some cannot be so treated.

The construction of the booster is very simple. A shallow tray or box of clear-grained ½-in. soft wood, measuring 6¾ in. long by 5 in. wide and 1⅝ in. high, inside measurements, provides the container for the ten flashlight cells. The corners must be square and there should be no metal projections of any kind inside. The over-all dimensions of the cover are 7¾ by 6 in.; four pieces of stiff spring brass, 1½ in. long by ½ in. wide, are cut and bent in the shape shown in the detail. A hole is drilled in the center of each and they are then screwed into the sides of the tray in the positions indicated in the layout, the first clip 1¼ in. from the end and the second one 2¾ in. from the first. The clips on the opposite side of the tray are mounted the same distance apart, but the start is made from the opposite end of the tray. Use short brass wood screws that will not pierce the wood, and arrange the clips horizontally so that they will make the necessary connections for the dry-cell units. Two brass end-cell connectors are

Upper Left, Completed Instrument Showing Carrying Strap in Position; Below, Details of Spring Clips, End Connectors and Close View of Top; Right, Timing Tube under Treatment

then cut from the same stock, ½ in. wide and 1 in. long, and a short length of flexible wire is soldered to each connector, as shown. These terminal connectors are then screwed to the inside of the tray about ⅝ in. from each end in the positions shown in the layout.



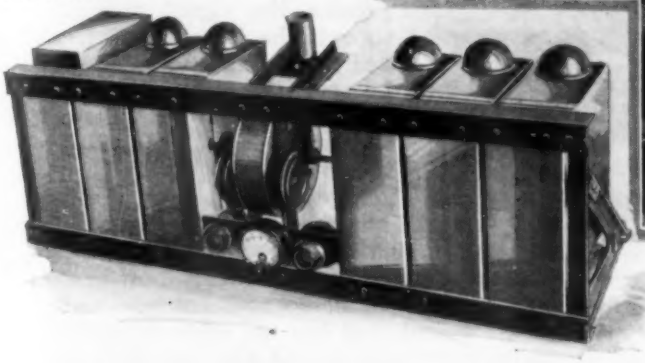
Above, Lid Partly Raised, Showing Battery Connections; Cut-Out Section at Front Shows Spring Clip in Position; Below, Line-Up of Cells and Layout of Tray

Ten flashlight cells, of the round 1½-volt type, are then inserted in the tray in the manner shown in the line-up diagram. The base of the zinc shell being the negative terminal of each, and the small-brass terminal at the opposite end the carbon or positive, two cells are laid end to end, positive to negative, and will just squeeze into the width of the tray; the direction of every other pair is reversed as shown in the diagram, the voltage being progressively indicated on each cell. Spring the brass clips out so that the cells are held firmly in place, making tight connections to the terminals. This line-up will bring one end connector against the negative pole of the first cell, and the other against the positive terminal of the end, or tenth, cell. Three thin brass connectors, 1 in. long and ½ in. wide, with a short piece of flexible wire soldered to each, are slipped between the cells for the voltage taps to the switch points, at 4½, 7½ and 10½ volts, the 15-volt tap being the lead from the positive end terminal. The three voltage connectors are placed between the third and fourth, fifth and sixth and seventh and eighth cells, respectively. The switch arm is mounted 1 in. from the end of the cover, and the four switch contacts as shown in the view of the top of the finished instrument. Care should be taken to let them project as little as possible on the underside of the lid. Glue a small arc of white bristol board or celluloid close to the taps, and mark the various voltages as shown. The tube socket is mounted at the other end of the lid and two small holes are drilled near the filament posts for the flexible leads, one to the negative end connector at the first cell and the other to the switch arm. The voltage leads are then soldered to their contact points on the underside of the lid, the 15-volt tap going to the positive end connector at the tenth cell. If flexible rubber-covered wire is not available, use No. 18 magnet wire and cover each lead with thin spaghetti tubing. Bend the ends of the brass strips over flat and fill any spaces between the cells with cardboard to keep them rigidly in place. Hinge the cover on one side and provide two small hooks, one at each end of the tray; arrange the hooks to engage with two pins driven in

MATERIAL LIST

1 box of ½-in. wood (inside measurements 1⅝ in. deep, 5 in. wide and 6¾ in. long).
1 lid of ½-in. wood (over-all dimensions 6 by 7¾ in.).
1 strip spring brass, ½ in. wide by 8 in. long.
1 piece of thin brass sheet, ½ by 3 in.
1 switch lever.
4 contact points.
1 standard tube socket.
1 adapter for 199-type tubes. If X-type sockets and tubes are used no adapter is necessary.
2 small brass hinges, with wood screws.
20 short brass wood screws.
10 1½-volt flashlight cells, round uni-cell type.
1 leather strap, 1 in. wide by 16 in. long.
2 small catch hooks, or a small hinged hasp.
2 ft. flexible rubber-covered fixture wire.

the ends of the cover so as to hold the lid tight down on the tray when closed. A small, hinged hasp may be substituted if desired. If there is any play between the lid and the cells use felt or cardboard to pack the cells firmly. The leather carrying strap may be made from an old belt and is fastened with short wood screws in the manner shown in the illustration, thus completing the instrument.



Left, Eight-Tube Neutrodyne, Showing Method of Shielding; Above, Comparison in Size and Type of Early Crystal Set with the Single-Control Receiver

To rejuvenate a tube, place it in the socket with the switch arm off; then with your watch in hand, flash the tube by placing the switch arm on the voltage indicated for that particular tube. For the UV-199 or C-299 tube, the flash should be on 10½ volts for 45 seconds. At the end of this period bring the switch arm back to the 4½-volt tap and leave it there for 10 minutes. Replace the tube in the set and, if the tube does not show the required improvement, repeat the process. The UV-201A and C-301A tubes should be flashed at 15 volts for 45 seconds and then burned at 7½ volts for 10 minutes. While the life of the small dry cells composing this unit is not long enough for use in a commercial way for tube boosting, the amateur who has only a few tubes to rejuvenate occasionally will be well served by the instrument. When the cells go dead, they should be removed quickly and fresh ones inserted.

¶The homemade battery charger described in our October issue is for 110-volt, 60-cycle alternating current only, not for 100-volt, as erroneously stated on page 657.

One-Control Neutrodyne Works on Loop

This eight-tube receiver of the neutrodyne type may be operated with one hand, through a precision single-control mechanism in the form of a bakelite disk which, by means of a vernier gear, turns a rotary drum bearing a wavelength scale. This one tuning control takes the place of ten ordinary adjustments and eliminates the necessity of expert knowledge in the operation of an elaborate receiver of this design. The set will work with either a loop, indoor or outdoor antenna. Copper shielding is used for the r.f. stages and the detector tube, and a steel compartment is provided for the a.f. stages. Metal caps above the assembly are removable for the purpose of inserting various tubes in their proper sockets. A double-range voltmeter is located below the control unit, and an eight-position switch permits the operator to note instantly the A, B, and C-voltages applied to the various parts of the circuit. New engineering features are claimed to eliminate distortion, insuring great volume combined with excellent tone and selectivity and ease of operation.

New Device Combines Phonograph and Radio

A new device combining the phonograph with the radio set is now available.

Radio Set Connected to Phonograph Reproducing Records with Increased Volume and Better Tone

The instrument is connected to the tone arm of the phonograph and a flexible cable, terminating in a specially designed plug, is inserted in the radio set. The record is played in the usual manner and amplified by the radio set, and the combination is claimed to give exceptionally good results. It has the advantage that favorite tunes can be played at any time with the full tonal value of the radio, and can be regulated fast or slow to suit the listener. Actually, the phonograph becomes the broadcasting station, so that all the advantages of radio tone are obtained without interference from static or other atmospheric disturbances.

Loud Speaker Shaped like Book

A new loud speaker of unusual design is made in the form of an open book. It has tinted pages done in sepia, is finished in gold and brown-morocco leatherette and has an artistic appearance. It rests on a small easel but may be hung on the wall if desired. It employs an electromagnetic unit applied tangentially to the edge of the curved membrane. This method differs from the usual pistonlike action directed at right angles to the surface. The speaker has a width of 17½ in. and is 13½ in. in height.

Loud Speaker, in the Form of Book with Illuminated Pages, Resting on Easel

Length of Aerial Important

In a large measure the performance of the set depends on the length of the aerial. The time has passed when the 100-ft. aerial was advised for all sets. As a general rule, the longer the aerial, the greater the signal strength, although the interference is amplified in the same ratio, and the set becomes sluggish. Also, the long aerial tends to absorb energy from the set, and has the effect of loading the circuit, preventing oscillation. The good results that are obtained by the long aerial are discounted by preventing the tuning of the modern set to the very low wavelengths, now in general use. For these waves a short aerial is required, and has the effect of adding energy to the set, also increasing selectivity. The aerial must not be too short, however, or the set will not operate. The proper length will be found by experiment. The height of the aerial depends on the location, and should be at least 20 or 30 ft. above the ground, the higher the better. For receiving purposes a single-strand aerial is just as efficient as the multiple-strand type. A good suggestion for the average set is to use three different aerials; a short one of about 40 ft. of the horizontal type, for stations below 300 meters; another about 70 ft. for the higher wavelengths, and one of the inside type for local stations. The latter may consist of two or more turns of bell wire around the room, behind the picture molding; a switch can be arranged for cutting in any one of the three aerials as the occasion may demand.

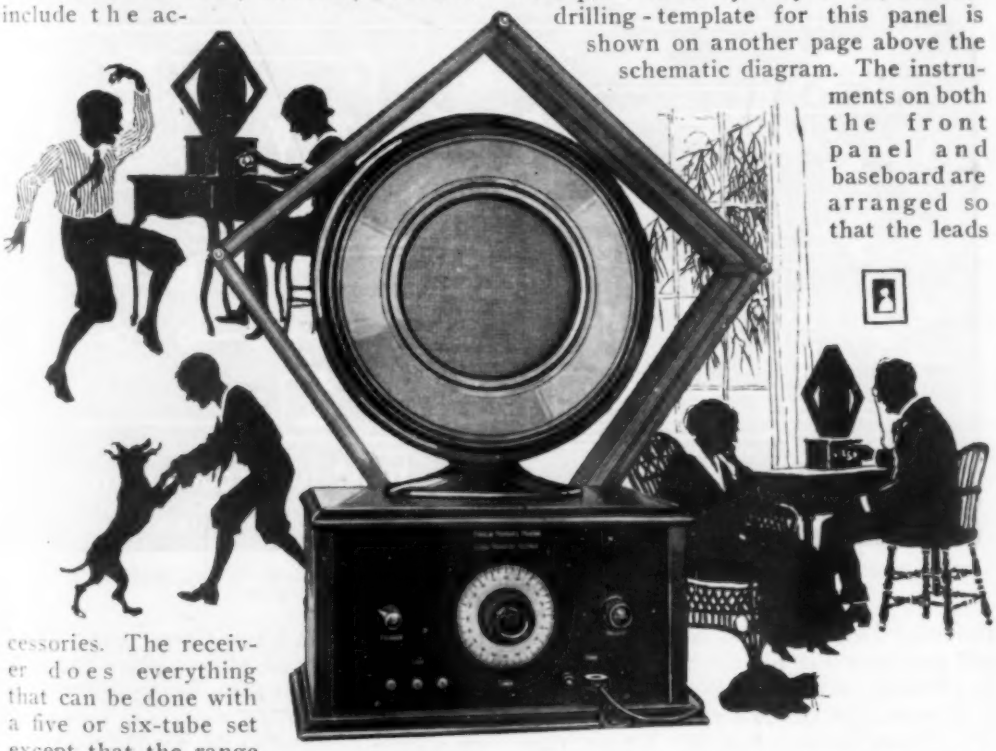
Three-Tube Set Works on Loop

Ideal City Set Is Selective, Operates Loud Speaker and Gets Rid of Aerial Nuisance

By FRANK L. BRITTIN

THIS little receiver is designed to fill a particular need and, for good performance at low cost, is in a class by itself. One often overhears a remark that runs something like this, "I would like to build a small set that would be selective enough to separate the powerful local stations, work on a loop, and have good loud-speaker volume; I am not interested in distance, as the local stations have excellent programs."

At first thought this seems like a rather large order, but Popular Mechanics radio laboratory now offers just such a set, thoroughly tested, that has excellent tone and good loud-speaker volume. The standard parts, shown in the layout, cost but $28.80; this cost, however, does not include the accessories. The receiver does everything that can be done with a five or six-tube set except that the range is limited to about seventy-five miles. In addition, it works on a loop instead of the usual outside aerial; no ground wire is required, and it is extremely simple to tune.



Although it is always best to follow material specifications closely for maximum results, this is one set where some latitude is permitted; with the one exception that the variable condenser must be of the type specified or similar type that has not a "live" shaft. The a.f. transformers may both be 3 to 1 or 3½ to 1 ratio, or as specified; the other parts will usually be found around the average experimenter's worktable or can easily be obtained from the nearest dealer in radio supplies.

The simple layout is clearly shown on the blueprint page and the battery hook-up is shown in the circle at right. The front panel is 3/16 by 7 by 14 in., and the drilling-template for this panel is shown on another page above the schematic diagram. The instruments on both the front panel and baseboard are arranged so that the leads may be kept short. The detector-tube socket must be of the cushioned type, but

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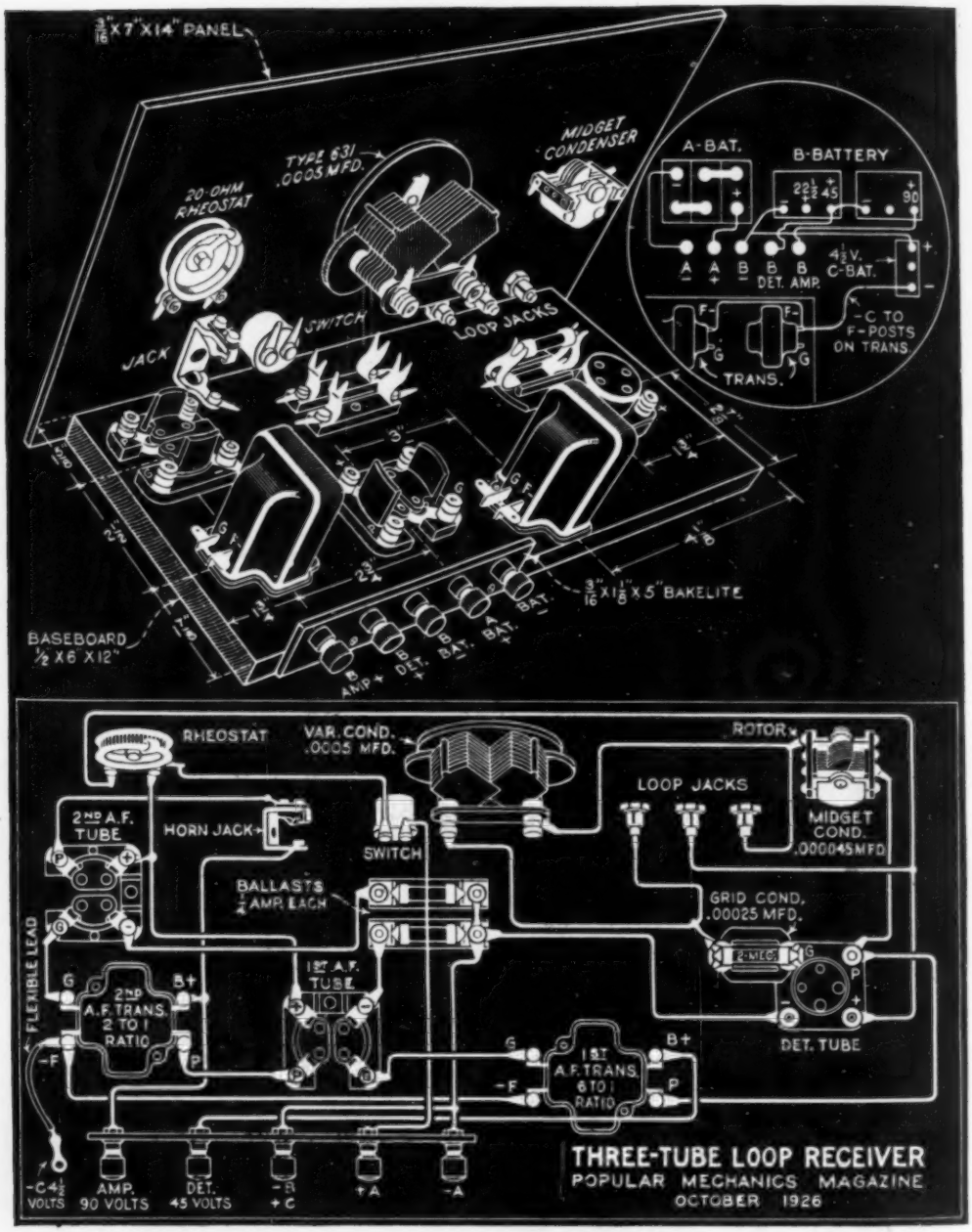
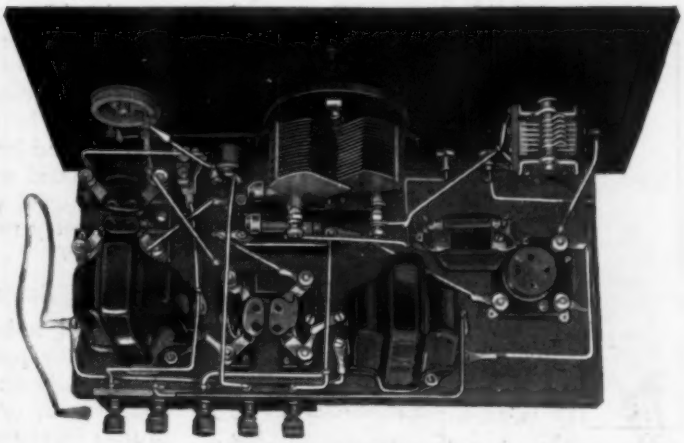


Above, Panel and Baseboard Layout Showing All Instruments in Position Ready for Wiring; Right, A, B and C-Battery Connections; Below, Simplified Wiring Diagram

the other two may be of any good standard type suitable for the tubes used. It is possible to use the 199 dry-cell tubes in this set, but the best results will be obtained with the standard 201-A type. One of the new 200-A or 300-A detector tubes may be used if desired, without changing the circuit. If a.f. transformers of different ratios are used, always place the one having the highest ratio in the first stage. The battery binding posts are arranged on a strip of bakelite, 3/16 by 1⅛ by 5 in., this strip being screwed to the rear edge of the baseboard as shown in the layout

diagram. Place soldering lugs of the long round-hole type under all terminals before starting the wiring.

The wiring diagram is given below the instrument layout and is so simple that little instruction is necessary. Follow the point-to-point connections carefully, and be sure that the rotor plates of the midget condenser are connected just as shown. It will be noted that the two ¼-amp. ballasts are connected together at one end and the lead taken to the negative-A post and to the negative post on the detector-tube socket. One ballast controls the filament of the first a.f. tube and the other the second a.f. tube, the detector tube being controlled by the 20-ohm rheostat. Use round tinned-copper busbar wire for the circuit and spaghetti tubing only where necessary to prevent shorts. The F-posts on the a.f. transformers are connected together, and the flexible lead, shown in the wiring diagram, is taken to the negative terminal of a 4½-volt C-battery, the positive lead from this C-battery running to the negative-B post that is common with the A-negative in the wiring diagram. This small C-battery takes up little room and may be placed in the cabinet with the set. The grid condenser and gridleak are mounted directly on the G-post of the detector-tube socket.



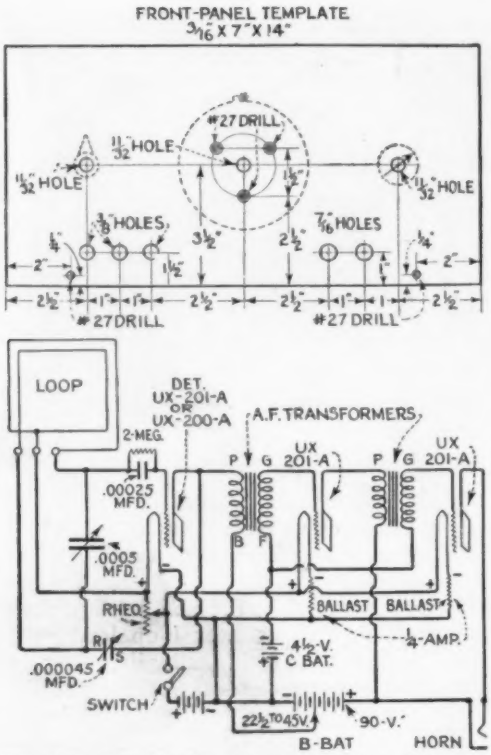
Rear View of the Completed Set

Check the wiring carefully and when completed, connect the A-battery and turn on the filament switch. Place one tube successively in each socket to test this circuit; if OK, turn off the switch and remove the tube. Now connect the B and C-batteries and place all three tubes in their respective sockets. The loop plugs are then inserted in the small jacks, taking care that the center loop lead goes into the central jack. Finally, plug in the loud speaker and the set is ready. Turn on the filament switch and slowly rotate the large condenser dial; if a station squeal is heard, adjust the midget condenser until this squeal is eliminated, bringing in the station clear with the large condenser. The detector-tube rheostat is then adjusted for best results, and one station after another can be brought in by slowly rotating the large condenser. After the correct setting of the midget condenser has been found, it will not be necessary to readjust it for every station. The loop will be found directional and usually gives best results when turned toward the transmitting station. This is not always the case, due to deflection from near-by metallic bodies.

This is a set that any child can tune and

MATERIAL LIST

1 panel, 3-16 by 7 by 14 in.
1 baseboard, ½ by 6 by 12 in.
1 20-ohm rheostat.
1 open-circuit jack, short type.
1 push-pull filament switch.
1 Remler capacity unit, .0005 mfd., type 631.
1 midget condenser, .000045 mfd.
3 midget loop jacks and plugs.
1 X-type tube socket, spring-suspended or cushioned type.
2 X-type sockets, any good make.
2 Daven ballasts, ¼-amp. each; complete with mountings.
1 grid condenser, .00025 mfd., with gridleak clips.
1 2-meg. gridleak.
1 a.f. transformer, 6 to 1 ratio.
1 a.f. transformer, 2 to 1 ratio.
5 binding posts with engraved tops.
1 bakelite strip, 3-16 by 1⅛ by 5 in.
1 4½-volt C-battery, large type.
2 45-volt B-battery units.
3 UX-201A or C-301A tubes.
36 soldering lugs, long round-hole type.
3 2-ft. lengths round tinned-copper busbar wire.
1 length good black spaghetti tubing.
1 three-tap loop, box-type preferred.



Front-Panel Drilling Templates, and Below, Schematic Diagram of the Set

the results are really remarkable for a loop set employing but three tubes. The razor-edge sharpness of tuning makes it an excellent auxiliary set for the big-city listener who may have a much larger set for the DX-programs. A large set, unless it be a superheterodyne, is not necessarily one that tunes sharply; in fact, very few large sets even of the tuned r.f. type are selective enough to separate the high-powered locals under all conditions.

A large blueprint of the layout and simplified wiring diagram, may be obtained from Popular Mechanics Radio department, 200 E. Ontario st., Chicago, for 15 cents to cover postage and packing. Specify blueprint No. 116.

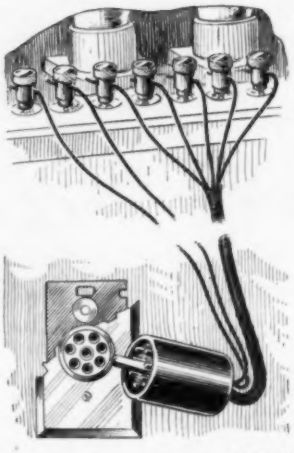
Alcohol for Cleaning Panels

Avoid water when cleaning radio panels or any part of a radio receiver. If the panel gets dirty or greasy, dampen a soft cloth with alcohol and rub it lightly over the surface to be cleaned. This will remove the dirt and grease, then dry the panel with another cloth. The alcohol will evaporate quickly without damaging the set in any way, and will leave a high polish. Ordinary household rubbing alcohol can be used for this purpose, but care should be taken not to spill any on the polished woodwork of the cabinet or console, as it will ruin the varnish unless immediately removed.

Some Radio Troubles

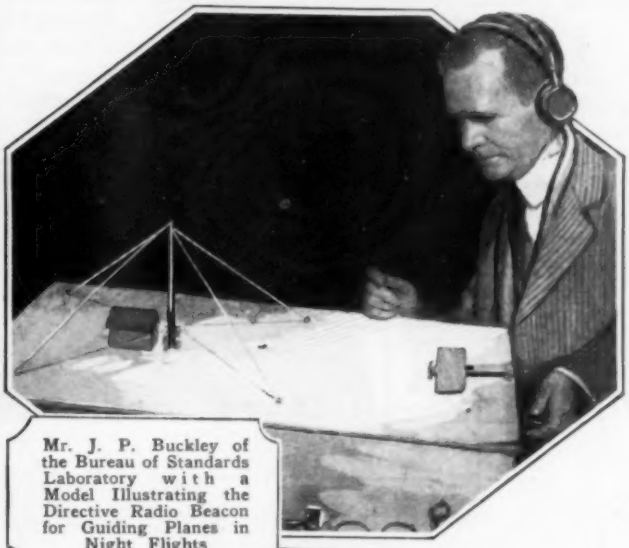
Clicking noises, heard when one presses against the panel or subpanel of a radio set, usually indicate a loose connection somewhere, or a faulty contact of tube prongs in the sockets. A loose or faulty grid connection usually betrays itself by a peculiar peanut-wagon whistle, which may also be due to leaky by-pass condensers, faulty transformers or loud-speaker cords. Grating noises, heard when turning the condensers, are often caused by touching condenser plates, which should be adjusted. In manufactured sets having sockets riveted firmly to the subpanel, the shells are sometimes a little too large for the tube base and the tube prongs do not make a good contact with the spring prongs in the sockets. Bend the latter up with a piece of wood and insert the tube carefully.

Wall Socket for Radio Batteries



A handy wall socket for the standard multi-plug battery-cable is now available. The socket is mounted in the wall at a point convenient to the set, and the leads are run to the batteries, preferably kept in the basement or an adjoining room. The corresponding leads from the plug are taken direct to the binding posts on the set, as shown in the illustration.

RADIO NEWS FROM FAR AND NEAR



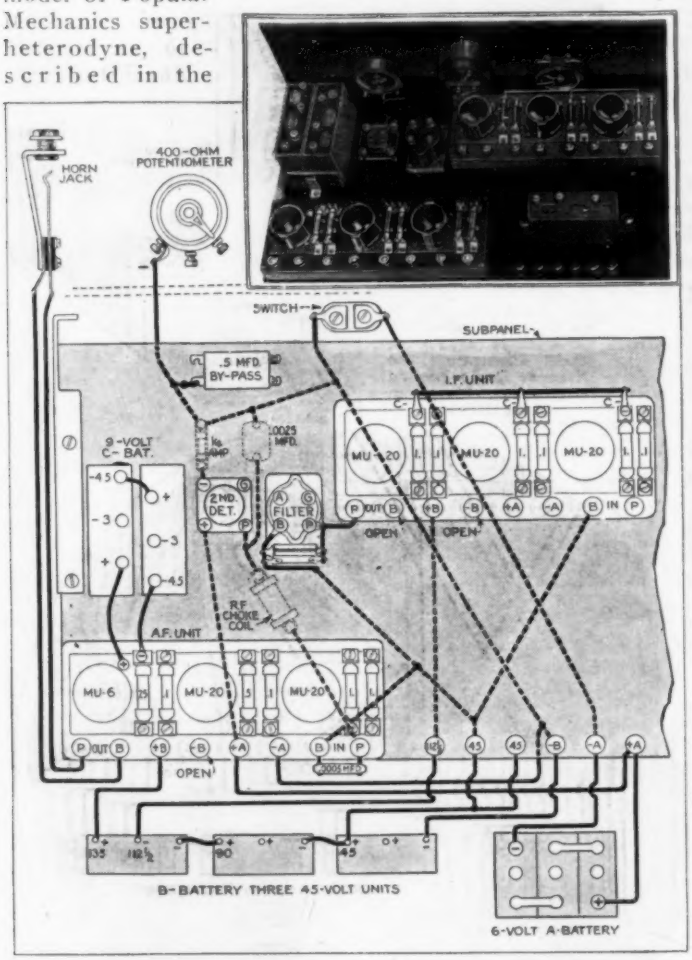
Mr. J. P. Buckley of the Bureau of Standards Laboratory with a Model Illustrating the Directive Radio Beacon for Guiding Planes in Night Flights

Pilot of Passenger Airplane Operating between Croydon, Eng., and Bourget, France, Equipped with Wireless Telephone for Safety Communications. Right, Two Japanese Misses with Parasol Receivers

Left, Japanese Performer before the Microphone in Station JOCK at Nagoya, Japan; This Station Serves Japanese and Chinese Listeners and Is Often Heard as Far as California

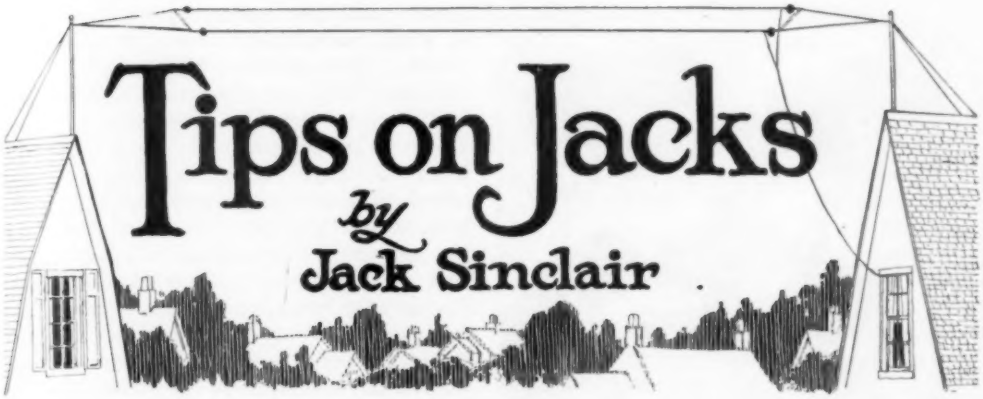
Using Resistance-Coupled A.F. Amplifier in 1927-Model Superhet

If desired, resistance-coupled a.f. amplification may be employed in the 1927-model of Popular Mechanics superheterodyne, described in the October, 1926, issue, and as many of our readers who have such amplifier units may wish to use them in the new set, we have prepared the accompanying wiring diagram, to show necessary alterations in the circuit. The photo at the upper right shows the changes in the layout, with the a.f. unit in position at lower left, but neither the wiring diagram nor the photo shows any other parts or wiring than those involved in the changes. The dotted lines indicate the wiring under the subpanel; the fixed condenser, choke coil and ballast, also mounted under the subpanel, being dotted in to show their location and facilitate the work.



The two 4½-volt C-batteries are connected in series for the necessary 9-volt C-battery required for the MU-6 power tube in the last stage. These C-batteries are located directly in front of the unit and are held in position with two short brass brackets, and a small strip of wood or bakelite is employed to wedge them in position. It will be noted that the A-battery connections to the a.f. unit are taken direct, as the MU-tubes have 6-volt filaments and are lighted directly from the 6-volt A-battery; the A-battery circuit being completed through the switch to the B-negative post that is common with the negative-A. A 1-meg. resistor is substituted for the usual .1-meg. in the first input clip of the a.f. unit. In some cases it will be advisable to use 2 meg. but greater volume is obtained with the smaller value. Before connecting the 9-volt C-battery to the unit, be sure to remove the connector strip between the small binding posts on the front edge of the unit. The various B-battery voltages are marked on the binding posts in the diagram and must be used as shown for best results. The volume of the set may be controlled by the oscillator rheostat, or by a modulator horn plug.

The October, 1926, issue, containing the complete article, may be obtained from Popular Mechanics Magazine, circulation department, 200 E. Ontario st., Chicago, at the usual price, 25 cents. The complete set of original blueprints, full-size drilling templates and additional photos are available from our radio department for 75 cents. Specify blueprint No. 114.



Tips on Jacks

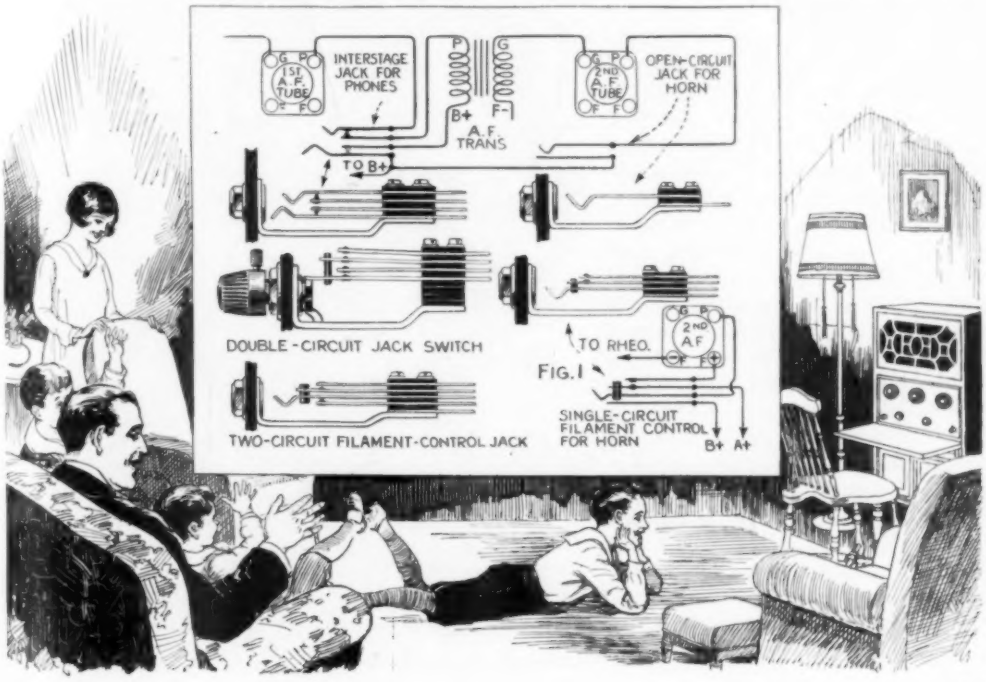
by

Jack Sinclair

JACKS are a small but important part of all radio receivers, every set having one or more of these switching devices. They are made in many types, and differ very little from those of the standard telephone switchboard. The types in common use are shown in Figs. 1 and 2. Those in Fig. 2 are of the new short type, desirable where compact wiring is necessary, as in portable sets, or wherever space is at a premium.

A little knowledge of jacks and their uses is of value to all radio owners and builders as they furnish an easy method of adjusting the set to suit individual needs. For example, one often wishes to use headphones instead of the loud speaker, especially late at night after the other members of the family have retired. If the set employs a horn jack only, it is not practical to detune or choke the set down for the phones. Also, phones are often necessary when locating distant stations which, when once located, may be tuned in at loud-speaker volume.

The insertion of an interstage jack in the first a.f. stage is a simple matter, the wiring diagram and illustration of the type of jack used being given in Fig. 1. If desired, the phone jack may be placed at the out-



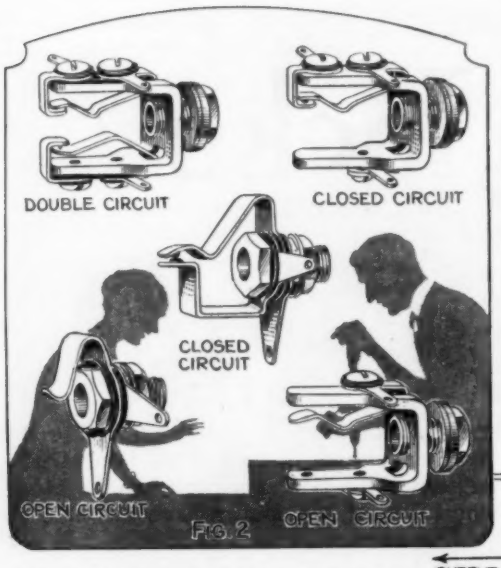


FIG. 2

put of the detector tube, but better DX results are obtained if one stage of a.f. amplification is used.

The diagram at the lower right, Fig. 1, shows a jack of the filament-control type applied to the last or horn stage. When the horn or loud speaker is plugged into this stage, the filament of the tube is automatically lighted. If an interstage jack is used for the phones, the horn plug is removed and the last tube is cut out, resulting in more economical operation. A two-circuit filament-control type is shown at the lower left in the same illustration, making possible the same kind of filament-control at any interstage point. The double-circuit jack switch shown above is an improvement of the standard jack in that no plug is required since it is operated by the small knurled knob at front. This type, which is available in several forms, is handy for cutting in various external devices, switching from phones to loud speaker, or from one speaker to another. Eliminating the plugs, the speaker and phone connections are made permanently in the set, and these jacks are commonly used in receivers of the console type where external leads are to be avoided. A plug combined with an adjustable resistance unit offers a convenient method of controlling the output volume without resorting to detuning or changing the set from its most efficient operating point. This is a simple matter for those using the standard jack and external plug for the loud speaker, but presents a problem where the switch jack is connected in the set itself. Fig. 3 shows the solution of this problem by rewiring the loud-speaker circuit and placing an open-circuit jack near the jack switch, so that the modulator plug can be used to control the volume. The modulator plug is shorted with a small loop of wire, with phone-cord tips at

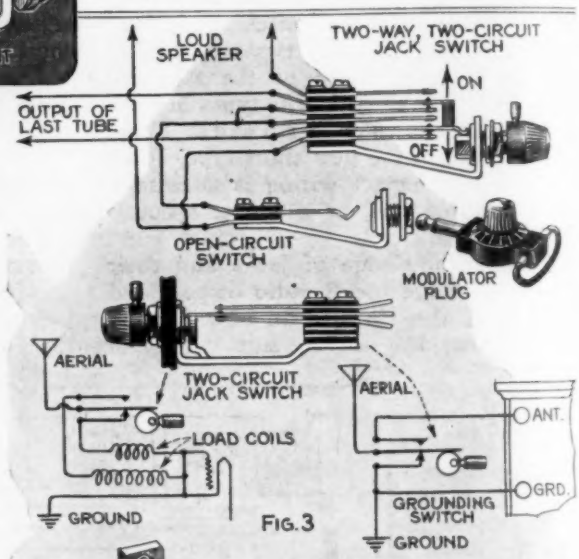


FIG. 3

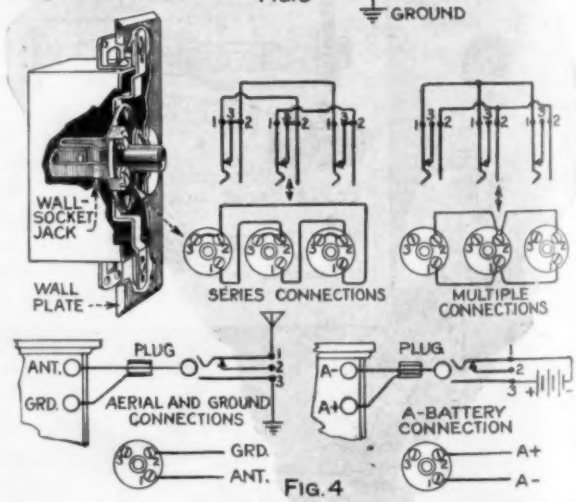


FIG. 4

either end, to complete the circuit through the plug. When the jack switch is in the on-position and the plug shorted with the wire, the loud-speaker volume is controlled by varying the small knurled knob on the plug. The wire across the plug may be removed and replaced with headphones, connecting the phones and speaker in series if desired. A second loud speaker located in an adjoining room can be plugged in instead of the phones for two-speaker operation if required. When the jack switch is thrown to the off-position the external speaker or phones can be operated independently of the loud speaker in the set. The two-circuit jack switch, Fig. 3, is useful for cutting in load coils as shown in the diagram below, or for an aerial-grounding switch, that may be thrown when the set is not in use, as shown at right.

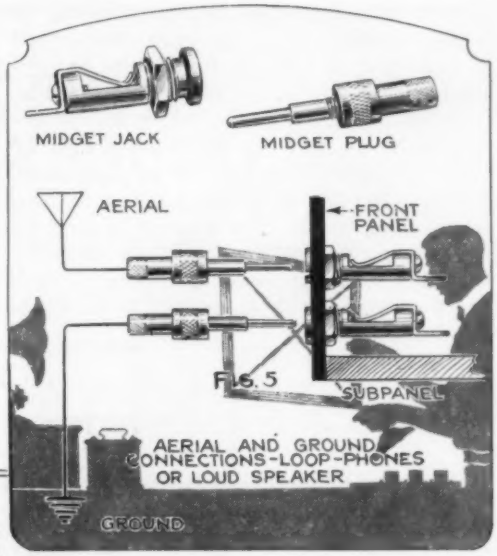


FIG. 5

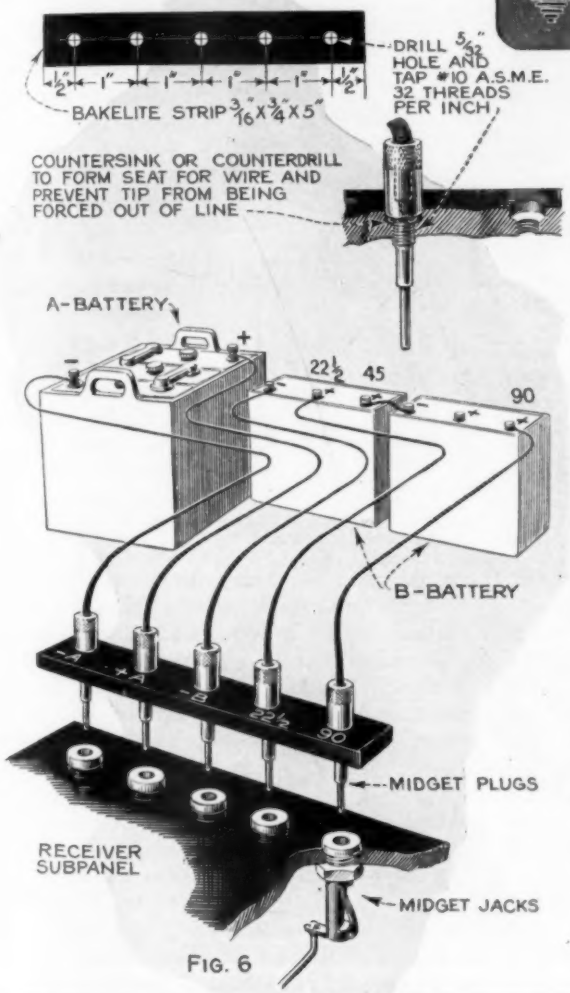


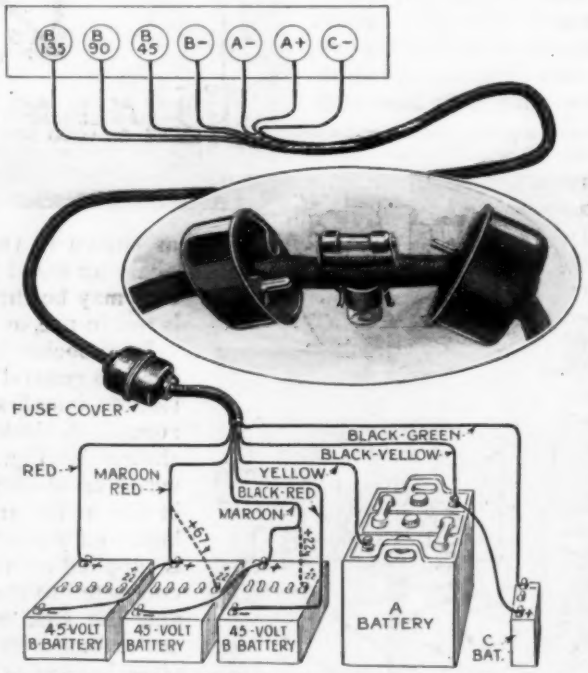
FIG. 6

Wall-socket jacks are now coming into general use and it is practical to install an outlet in every room. A jack of this type is shown in Fig. 4 and is easily wired as shown in the diagram. It fits in the smallest-size outlet box, and a neat brass wall plate is supplied with it. The wires are connected to the screw terminals, and the jack is fastened to the outlet box with two screws; the plate is then attached. In addition to serving as a convenient outlet for connecting phones or loud speakers, this type of jack may also be used for connecting ground and aerial wires to the set, and for battery connections. Batteries may be placed in the basement, or elsewhere, and the wires brought to the wall-socket jack located at a point near the set.

Handy plugs and jacks, known as the midget type and shown in Fig. 5, are in great favor with the experimenter. The aerial and ground diagram shows one of many applications. They are also used extensively for loop connections and to take the place of

battery binding posts, as shown in Fig. 6, which illustrates an arrangement made in the form of a block for all the battery connections. The jacks are mounted at the rear of the subpanel and centered exactly 1 in. apart. The plugs are set in the strip of bakelite shown in the diagram, so that all connections are made or broken at the same time. The mounting strip is, of course, subject to variation for the number of connections necessary. Spot the location of the plugs along the strip, carefully spacing the plugs as indicated. When the connector strip has been laid out, clamp it to the subpanel in the position it is to occupy in the finished set, and using a 5/32-in. drill, perforate the strip and subpanel. The holes in the latter will serve as centers through which the somewhat larger drill required to make the holes for fitting the jacks are drilled. This will insure an accurate line-up of the plugs. The holes are now tapped for the plugs in the connecting strip. For this purpose use a No. 10 A.S.M.E tap having 32 threads per inch. After the holes are tapped, they are countersunk or counterdrilled slightly, to form a seat for the wire and prevent the tips from being forced out of line. The threaded sleeve that is a part of the plug, and which is required when the plugs are used individually, is removed and discarded. Insert the wire in the hollow end of the tip, bringing the bare end out through the hole provided for this purpose, and bend it around under the shoulder above the threads; the plug is then screwed into the bakelite strip.

Flexible, rubber-covered wire is recommended for the battery connections. The jacks are mounted on the subpanel and the set leads soldered to the lugs. The contact springs are held in place by small screws with lock washers under them, to secure a good permanent contact.

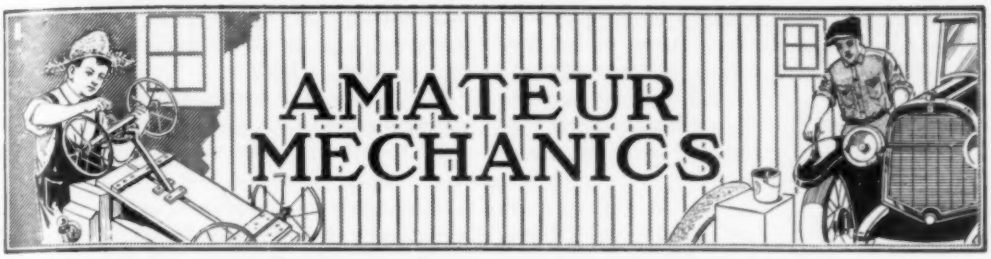


Fused Battery Cable with Connections from Battery to Set; Insert, Bakelite Cover Separated, Showing Position of Fuses

Fused Battery Cable Protects Tubes

A new battery cable is provided with fuses designed to protect the tubes, wiring and rheostats in a radio set from short circuits. A small capacity fuse is inserted in the B-negative battery lead, indicated by the black-red wire, and a 2-amp. cartridge fuse is placed in the positive A-battery lead, indicated by the yellow wire. The fuses are removable and are protected from breakage by a bakelite cover held together by two friction pins. These cables are available in five and seven-conductor types, but the position of the fuses is the same in both types. The B-battery fuse is designed to protect the tube filament from high B-voltage should it be applied through error or accident. It will protect a single tube of the 201-A or WD-12 type, which have a current consumption of .25 amp. or three tubes of the UV-199 type, which consume .06 amp. each.

¶Side-cutting pliers look very much like other pliers, although in reality they are not pliers at all, and in radio work are far superior to the regular kind with the cutter below the nose; they are especially handy in cutting off wires in difficult places when wiring complicated circuits.



Build a Winter Toboggan Slide

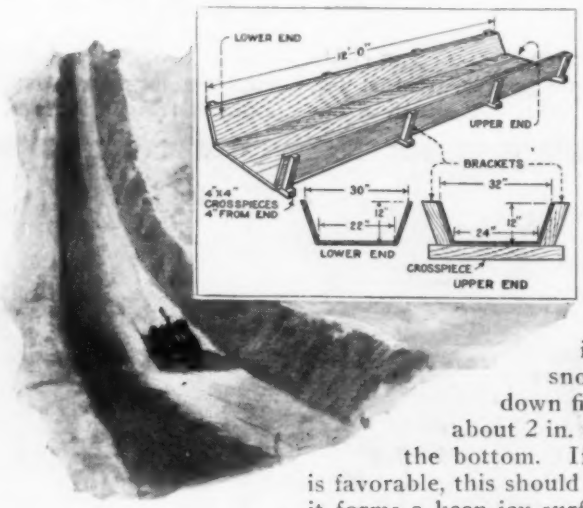
By EARLE W. GAGE

ALTHOUGH making a toboggan chute is a very simple matter, it must not be slighted in the least. As much attention should be paid to its building as the engineer pays to providing a track for an express train. In fact, few trains travel

"Zipping" Down an Icy Path at Ninety Miles an Hour, with Body Close to the Whizzing Face of the Ice—a Real Delight of Winter!

at the speed of the average toboggan. A slight miscalculation in a curve will make the swiftly moving toboggan turn turtle; a small deficiency in the edging of the track may turn the swooping thing loose in the unpacked snow and send its passengers to the hospital.

Tobogganing carried on in soft snows on hillsides is great fun, but the iced slides, where high speed can be attained, are the real sport. Such a slide usually crowns the summit of some slight elevation, and the depth of the drop is made gradual by supporting trestlework, the width of which varies according to the number of chutes desired. These chutes are virtually troughs, flooded and frozen, one separated from the other by means of a ridge of boards and ice at the starting platform, and by frozen-snow sides from that point on. Each groove is the width of a toboggan, so that steering is unnecessary, and the risk of upset and accident is reduced to a minimum.



A very satisfactory slide may be built of planed spruce boards in sections 12 ft. long, each being in the shape of a trough. The inside width of the trough should be 22 in. at the lower and 24 in. at the upper end, the sides being 12 in. high with a flare of 4 in. Four 4 by 4-in. crossbars are used to tie the boards together, each bar extending 4 in. beyond the bottom boards, and carrying a bracket cut from the same size of wood to hold the sides in place.

The crossbar on the upper end of the trough is exactly at the end of the boards; at the lower end it is 4 in. from the end. This allows one trough to lap 4 in. into the other. The bars should be so placed as to butt tightly against each other. The distance between them is divided to equalize the strength of the trough. All edges and corners are planed off to prevent splinters, and a sharp lookout must be kept on the edges.

The individual troughs are thoroughly nailed, but no nailing is done in putting the slide together. The troughs are simply placed in position on the ground, beginning at the lower end and fitting in each toward the top, leveling under the bars as the ground may require. This chute will be found a very convenient size. The sections are easily handled and packed away, and they will last for many years if they are given proper care.

In order to have the chute in good running order, the ice in it must be smooth and keen. It is best prepared by filling the chute with snow and beating it down firmly until a layer about 2 in. thick is formed in the bottom. If the temperature is favorable, this should be sprinkled until it forms a keen icy surface. After a few days' care and cold weather, the condition of the chute will improve. Should holes form in the ice, they may be patched with snow, sprinkled until it forms a slush and beaten smoothly into the holes.

A line should be drawn from the point in the field where the run is to end, straight to the bottom end of the toboggan slide, and the runs built from the bottom upward, so that the lower sections can be used while the construction of the upper part is still in progress. Sprinkle the snow that has been packed into a groove to provide an icy coat. Never use the run when there is the slightest chance of the runners cutting through, for this will ruin the slide.

The larger runs, where winter sports are the fashion, average anywhere from a quarter to a mile in length, and they have a drop of from a few feet up to several hundred feet. They may have every variety of turn, from the sharp corner to the most gentle curve. There is a 2,100-foot chute on the Hudson river, New York,

where the start is down a slope of not more than 30°, yet the speed attained at once is breathless. The all-wooden toboggans do the chute in from 20 to 26 seconds, and the steel-shod type in from 12 to 17 seconds.

The modern toboggan, described as a skeleton, consists of a light, but exceptionally strong, steel framework with a yard-long padded seat, on which the rider lies flat, steering the craft with hands and feet. In order to secure both strength and lightness, it is built narrow, of well-seasoned, straight-grained wood, fastened together by light crosspieces, usually of steel; the front end is bent up and over to form the hood, and fastened securely by means of wire or leather thongs. Toboggans are 4 to 9 ft. long, about 18 in. wide and hold from one to five passengers.

Indirect Illumination on Dash

Some of the latest and newest models of automobiles are being fitted with indirect dash lighting. To accomplish the same purpose it is possible to mount the light on the steering post as shown, so that the rays of light will not strike the driver's eyes.

Marking Films in the Dark Room

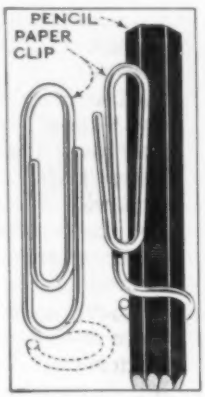
I have developed many thousands of films and for some time had difficulty in reading the numbers or names written on the red paper when working in the dark room. Finally I hit on the following simple remedy. All films were inscribed with a blue pencil. When looked at in the red light the blue inscription appeared black and made reading easy. Ordinary penciled or inked letters fade into the red paper when viewed under a red light.—L. B. Robbins, Harwich, Mass.

Emergency Gluepot

When a large quantity of glue has to be heated and no pot is available, a good one can be made in a few moments. Just get a 25-cent galvanized - iron pail at the hardware store, and pick up an empty 5-gal. oilcan at a neighboring garage. With tin snips, cut the latter off halfway from the top, as shown, bend the sharp edges over toward the inside and hammer them flat, so that there will be no danger of cutting one's hands. Fill this part about half full of water, put the glue in the pail and set the pail in the can. This makes as good a gluepot as you can wish for.—E. R. Haan, Chicago, Ill.

Paper Fastener Makes Neat Pencil Clip

In offices and schools, where pencils are frequently lost or mislaid and one finds it rather expensive to buy new clips all the time, it is much better to use the cheap and easily made clip shown in the illustration. It is formed from an ordinary paper clip; one end of the clip being bent down and around to form an eye that fits over the pencil snugly, as indicated by the dotted lines. A pair of long-nosed pliers is the best tool to use in doing the bending.



¶The burner of an acetylene bicycle lamp fitted to an ordinary gas jet will produce a very hot flame.

Continuous Supply of Paper for Drawing Table

Here is a drawing table that has a continuous supply of paper on hand. No

Drawing Paper Is Always Handy When a Roll Is Attached to the Table

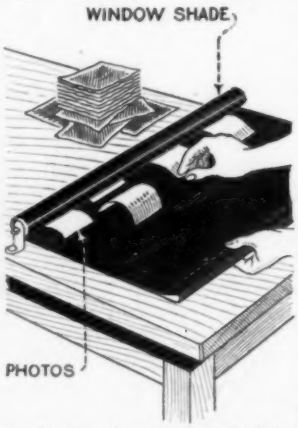
dimensions are given for the table, but the front edge of the top should be at least 32 in. from the floor, with the top at the rear about 4 in. higher. The table proper should be about 3 ft. wide and 3 or 4 ft. long. Ordinary ¾-in. lumber can be used throughout, except for the legs. These are cut from 2 by 4-in. stock so that each is approximately 2 in. square. Set the legs through the bottom of the table so that they come to the top in each of the four corners, thus providing greater strength. Each leg can be braced at the end by mortising in 1 by 3-in. pieces, and a footrest can be provided if desired. Cut boards for the top with the edges well jointed and with cleats on the underside for additional strength. The top should project over the front about an inch to facilitate lifting and also to give greater arm room. Ordinary hinges can be attached for holding it in place. For the drawing-paper feature, erect two boards at the top and back of the table in an upright position, attaching them with screws through the underside or bracing them with additional pieces on the outside. Provide each upright with a notch to take the rod which holds the paper roll. Place the roll between the uprights and attach a strip of iron or brass to the table top, as shown, by means of bolts. The front edge of the iron strip should be beveled slightly so that the paper will tear smoothly. This strip should be held down snugly. To facilitate pulling out the paper after one piece has been torn off, cut a depression just under the middle of the iron strip in the table top or drill a hole clear through. This will give your thumb and finger room to grasp the paper and pull it.—Dale R. Van Horn, Walton, Nebr.

Priming Wood

Many painters have used yellow ocher for priming because it is cheap, but actually it is most expensive, because it is too coarse to penetrate the pores of the wood and get any kind of an anchorage. It also absorbs moisture, which naturally affects the succeeding coat of paint. Sometimes it comes to the surface after the job has been finished, causing blistering and peeling, and in some cases it has never dried. From these facts it is easy to see that there are some materials which may be inexpensive but lead to a great deal of extra work to correct the error of using them. —L. H. Georger, Buffalo, N. Y.

Photographic Prints Are Flattened in Roller Shade

Photo prints generally curl when drying, but can be readily flattened again by rolling them in a curtain as shown in the drawing. Of course, the prints are placed on the shade with the concave side down so that, when the shade is rolled, the prints will be turned in the direction opposite to the curl and this will flatten them. Sometimes it is necessary to repeat the operation a few times.—Walter X. Brennan, Mt. Clemens, Mich.

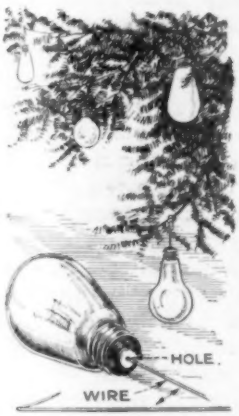


Effect of Temperature on Varnish

According to the best experience with varnish there are several points in its application which are of value to assure good work. The quantity of turpentine should be twice that of the oil. Turpentine must be used in all varnish or it will not dry, but less turpentine is needed in summer, because the heat causes the varnish to get thicker. In winter less oil should be used so that the varnish may dry rapidly, and more turpentine to increase the evaporation.

Christmas-Tree Decorations

In decorating Christmas trees a saving can be made by using burned-out electric lamps. They usually can be obtained for the asking, and should be prepared as follows. Using a drill press, small holes are bored through the cement in the base of the lamps. Wire loops, bent as shown, are slipped into these holes, the bend preventing their easy withdrawal, and the projecting wire is wrapped about the tree branch with ease. The bulbs are dipped into a dilute solution of shellac and dusted with ground glass, of which different colors are obtainable. While such decorations are, of course, suitable for the home tree, the idea was found especially valuable when it was necessary to decorate a large tree for a public square.—H. E. Benson, Boulder, Colo.



Corrosion in Hot-Water Pipes Prevented by Water Glass

Corrosion in hot-water or steam pipes can easily be prevented by adding ½ gal. of water glass to the water supply and letting it circulate for a day or so before the furnace firing is discontinued. The water glass forms a coating on the inside of the pipes, which effectively prevents rust after the water has been drained out.

Increasing Capacity of an Ordinary Swing So That Three Can Ride Comfortably

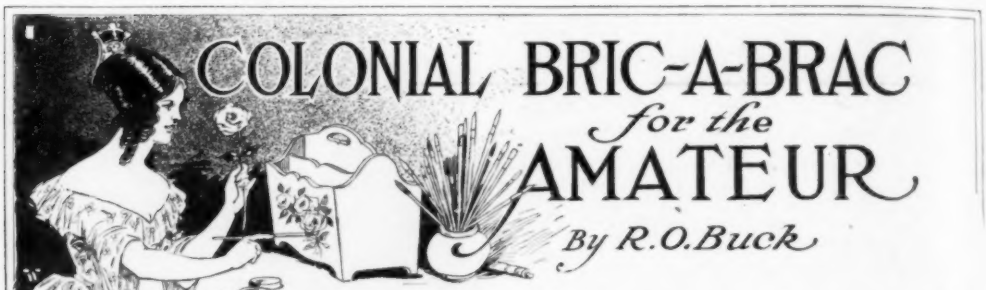
Increasing Capacity of Swing

Even young children have inventive ability, as is illustrated in the photo. Where it was possible for only one to use the swing previously, three children can now ride at once and with more comfort. An extra rope is used to hold a board horizontally. Large screweyes are driven into the underside of the board and the rope is passed through these so that it cannot slip from under the board while the swing is used.—James E. Noble, Toronto, Can.

Shock-Absorbing Seat Cushion

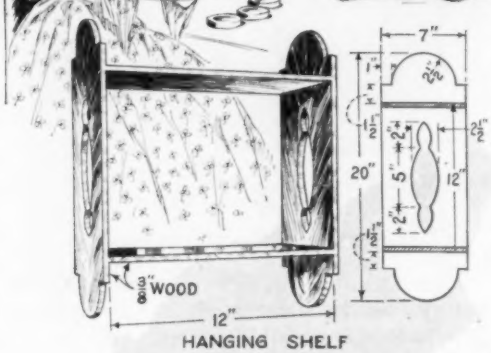
The driver of a Ford truck, hauling lumber from a portable mill over a rough road, devised a shock-absorbing seat cushion from an old inner tube. He claims that this device not only lessens road jar, but is also much cooler in summer than the usual upholstery. Such a cushion is made by folding an old inner tube as shown in the photo. It is kept in place by a length of rope.—F. Amos, Kalama, Wash.

¶ A clay pipe can be used as a crucible by breaking off and plugging the stem.

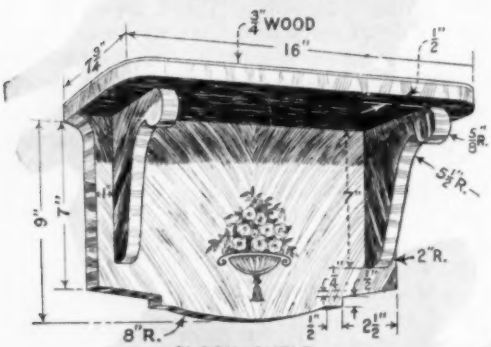


COLONIAL BRIC-A-BRAC *for the* AMATEUR

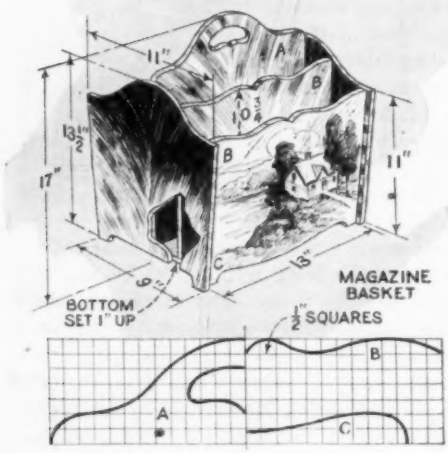
By R. O. Buck



HANGING SHELF



CLOCK SHELF



MAGAZINE BASKET

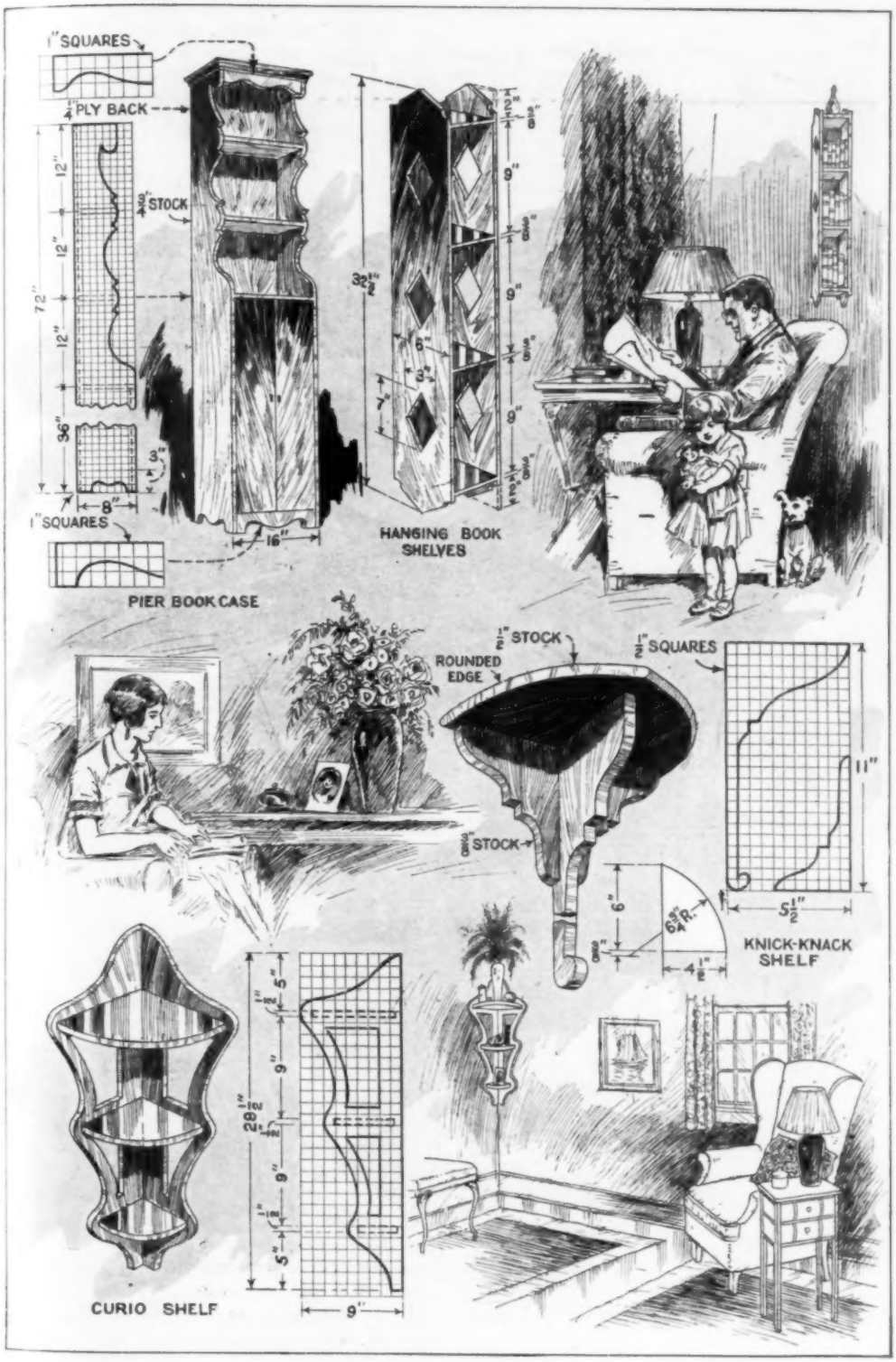
THE cycle is complete and the things our grandmothers considered smart are back with us again. The whatnot, corner shelves, wall brackets, and the like, have come into their own. Those of us who are fortunate enough to have some of these treasures of a former day in our attics can get them out, give them a bit of finishing and make them the envy of our less fortunate friends.

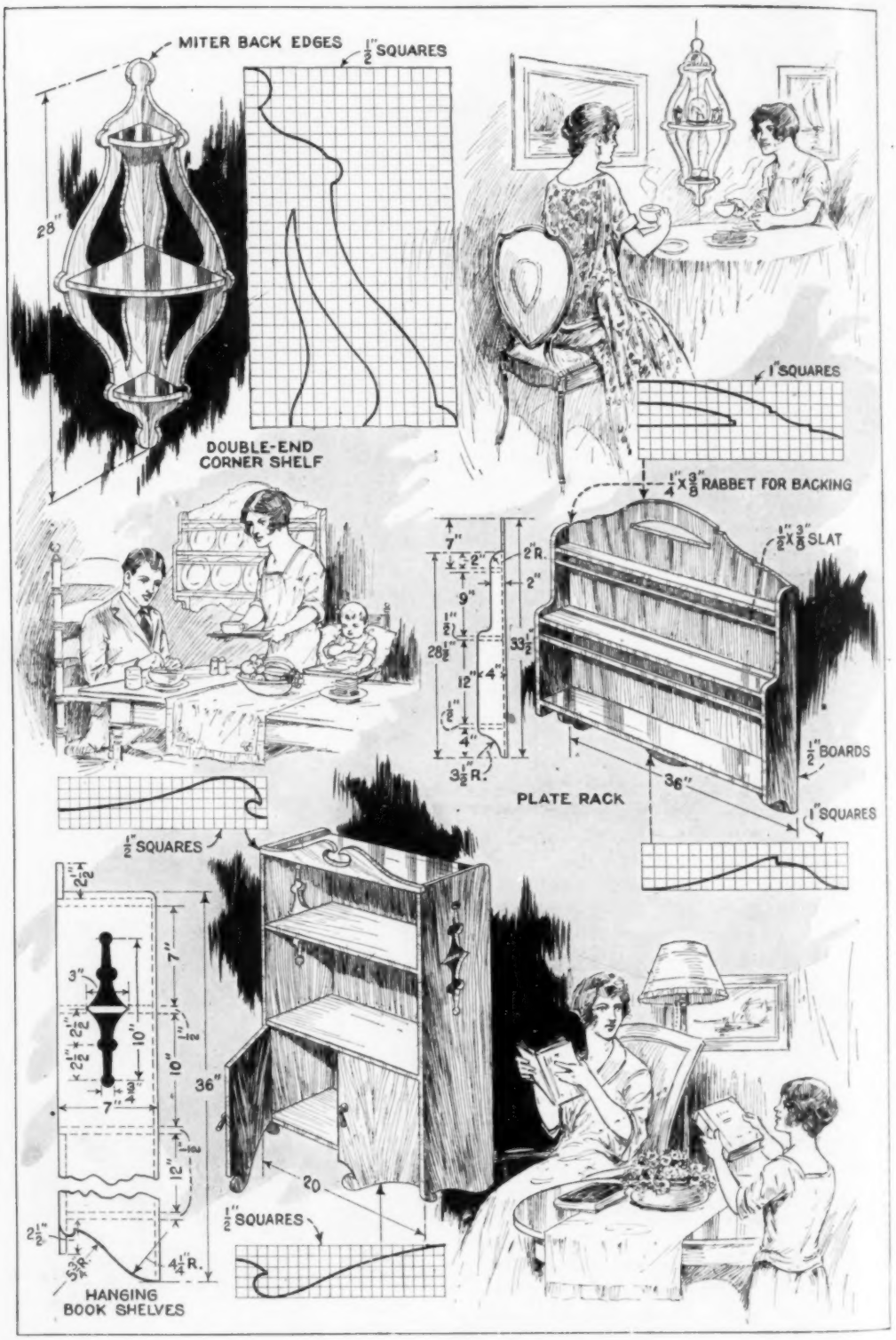
In case you happen to be one of the aforesaid friends, and possess neither attic nor heirlooms, you can, if you are handy with tools, make any of the articles illustrated with just the ordinary tool equipment found around a home. You will be agreeably surprised and pleased to note the change a few articles of this sort will make in a room. The home touch which you may have missed in your modernly furnished rooms can be added in just this way and with a very small expenditure of time and money.

Most of the articles illustrated are small and can be constructed of any close-grained soft wood of the thickness shown. Poplar, gum or white pine are all suitable for the purpose. For two or three of the larger articles, plywood is specified, so that greater width or strength may be obtained without the necessity of increasing the thickness of the pieces and producing a clumsy-looking piece of work.

A cross-section diagram is given of all the curved edges so that you can lay out a full-size pattern easily, or perhaps you may wish to design these curves yourself. If you do so, avoid sharp changes and rather make the lines of the curves long and sweeping.

Brads and finishing nails driven home with a fine nail set are best for fastening objects of this nature. Glue is not advis-


1" SQUARES
1/4" PLY BACK
3/4" STOCK
12"
12"
12"
72"
36"
3"
8"
1" SQUARES
16"
PIER BOOK CASE
32 1/2"
2 1/2"
3/8"
9"
9"
9"
6"
3"
7"
HANGING BOOK SHELVES
1 1/2" STOCK
ROUNDED EDGE
3/4" SQUARES
11"
3/8" STOCK
6"
6 3/4" R.
5 1/2"
4 1/2"
KNICK-KNACK SHELF
5"
9"
9"
5"
28 1/2"
9"
CURIO SHELF

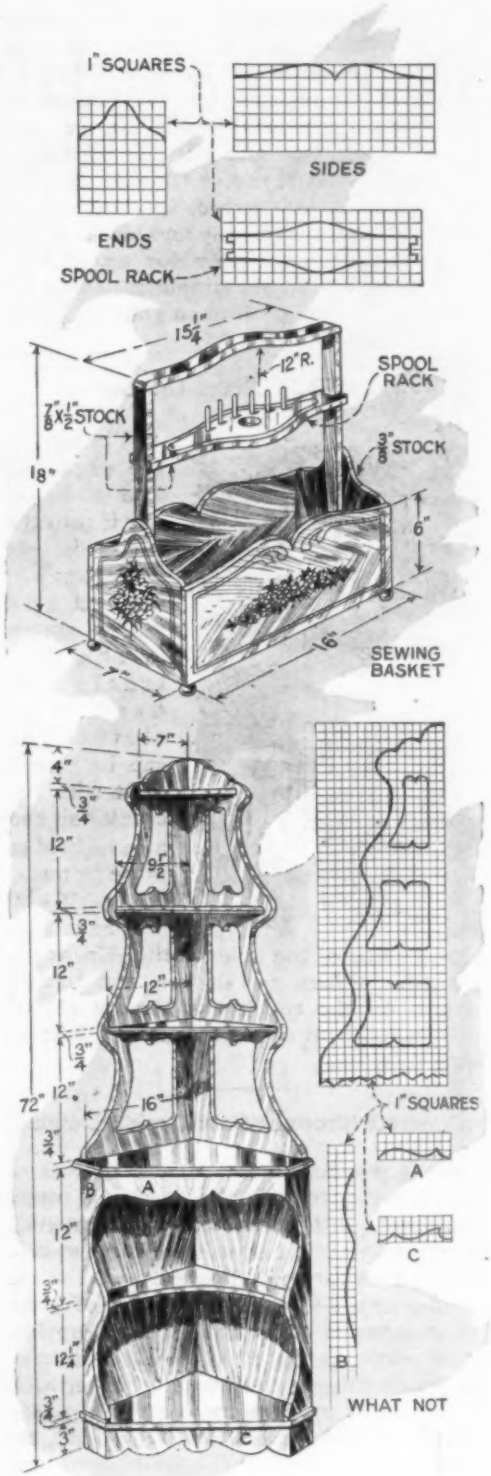

MITER BACK EDGES
1/2" SQUARES
28"
DOUBLE-END CORNER SHELF
1" SQUARES
1/4" X 3/8" RABBET FOR BACKING
1/2" X 3/8" SLAT
7"
2"
2" R.
2"
9"
1/2"
28 1/2"
33 1/2"
12"
4"
1/2"
4"
3 1/2" R.
PLATE RACK
36"
1/2" BOARDS
1" SQUARES
1/2" SQUARES
2 1/2"
3"
2 1/2"
2 1/2"
10"
7"
4 1/2"
7"
10"
36"
1/2"
12"
1/2"
20
1/2" SQUARES
2 1/2"
5 3/4" R.
4 1/4" R.
HANGING BOOK SHELVES

able owing to its likelihood of working through the finish. After the article selected is finished, it should be sanded carefully with No. 00 sandpaper. A piece of sandpaper wrapped on a dowel rod is excellent for smoothing the edges and scrollwork.

If your home is furnished with antiques you may wish to make your bric-a-brac of walnut, in which case a finish of linseed oil, hand-rubbed, is most suitable. The modern way of finishing these articles, however, is to use bright-colored paint or lacquer, so that they may give life and color to the room. Either Japan colors, followed by several coats of varnish rubbed to a dull luster, may be used, or, if you are anxious to put the articles to use and do not wish to wait several days for the various coats to dry, I would suggest the use of the new brushing lacquers which dry hard in half an hour. Take care in the selection of these, however, as there are some brands that are not altogether satisfactory. You will be safe in selecting the product of one of the high-grade manufacturers, if you follow the directions on the can explicitly.

Lacquer is flowed rather than brushed on a surface. A good quality, rubber-set chisel-shaped brush, about 1½ in. wide, is most suitable. Be sure to stir the contents of the can thoroughly so that a uniform color and consistency will be obtained. It is advisable at the start to wet your brush in some of the thinner furnished by the same manufacturer, so that the brush will be soft and pliable. Also, it should be well filled with the lacquer each time it is dipped and care should be taken not to brush too much. If the lacquer sets too rapidly a small amount of the thinner may be added, but unless the can has been opened before, it will likely be of the correct consistency.

Lacquer must be handled quickly as it dries almost as soon as applied. Be sure the surface is dust-free, clean and dry. Two coats are usually all that are required on new work and the second coat may be put on within an hour after the first was applied. A third coat, if needed, should never be given within 24 hours, as it may cut the under coats and raise the finish. The brush should be carefully cleaned with thinner before putting away or else

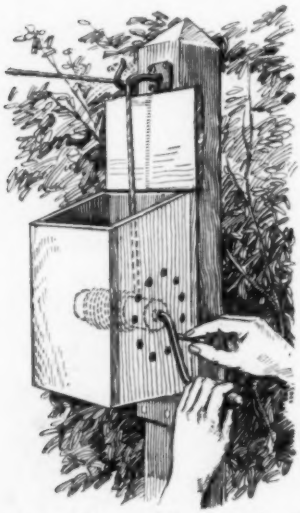


it is almost impossible to get the lacquer out of the brush. Lacquer is not only desirable because of its durability and quick-drying qualities, but also because of the beautiful colors which can be produced so easily. The popular colors for articles of this type are Chinese red, tobacco brown, jade green, Chinese yellow, Holland blue, nickel gray and black. Black may be used effectively for an all-over coat with red or gold stippling, or just for edges or blending. Roman gold is used in much the same way or as your ingenuity may suggest.

Designs similar to those sketched can be obtained in the form of transfers from most art-material dealers and add greatly to the beauty of these articles, especially if they have rather large parts of the surfaces exposed.

No home workshop member need hesitate about attempting any of the articles illustrated, as he can rely on the finish to cover up minor imperfections.

Box on Pole Stores Clothesline

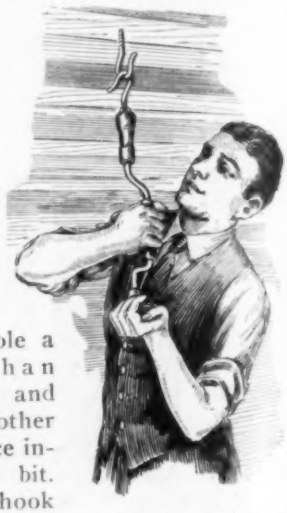


Winding up the clothesline and taking it into the house is not necessary if the reel and holder shown in the illustration are used. The clothesline can be drawn tight with the crank and can also be held in place by pushing a ¼-in. carriage bolt through one of the holes in the side, as indicated. When not in use, the line is wound on the roller and the lid closed until wanted again.—Francis W. Henry, Pottsville, Pa.

Concrete Troughs Cast Upside Down

When wooden forms are made for casting concrete troughs, the builder is often confronted with the difficulty of removing the trough intact because the form swells after the concrete is poured. The work can be simplified and the expense of lumber reduced by casting the troughs upside down over earth forms. Lay several planks on the ground, close together and level. Build up a mound of earth, preferably clay or some close-binding soil, to the shape and size of the interior of the trough. Wet it, pat it down and then cover it with tar paper, pinning the latter in position with a few nails stuck through the paper into the form. Build a board form for the sides and ends of the trough, making it several inches wider and longer than the dirt form, and place it over the latter. The form should be about 4 in. higher than the mound. Pour in the concrete and allow it to set for three or four days. Then, by knocking off one side of the wooden form, the rest may be removed. The resulting trough can be picked up and turned over, and the rough corners and edges can then be smoothed off. This method saves much time in form building and gives just as good a job.—L. B. Robbins, Harwich, Mass.

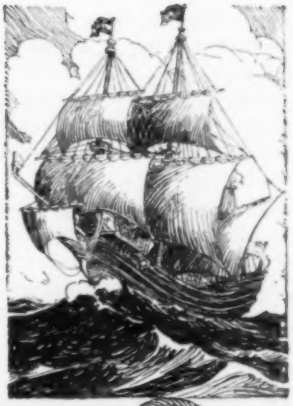
Driving Screwhooks into Ceiling



When fastening screwhooks in ceilings or other places for ceiling fans, fixtures, gymnasium equipment, etc., I have found the following method entirely satisfactory. First drill a hole a little smaller than the screwhook and then insert another hook in the brace instead of the bit. Start the screwhook into the hole and drive it home as shown in the drawing.—Thos. F. Johnson, Schulenburg, Texas.

Build Your Own Ship Model

By J. EARLE MILLER



Parts 1 and 2 appeared in the October and November issues

YOU are now ready for the strakes, or bands of molding, along the hull, which serve both for ornament and as bumpers to protect the ship when rubbing against the dock. The strakes are 3/32 in. thick and 5/32 in. wide. Start with the top band along the poop. It begins on the line of the main-deck rail, where the latter curves sharply upward to meet the poop rail, and runs back, parallel to the latter and 3/8 in. beneath it. Glue and pin it in place. The next strake runs along the top edge of the solid main-deck bulwark, just beneath the stanchions, and continues the full length from stern to fo'c'sle. The curve of the bulwark gives the correct line, and when carried out to the stern, the strake will be parallel to the first one. The same curve is carried forward and upward along the fo'c'sle so that the strake is parallel to the fo'c'sle bulwark line. A short strake is glued along the bulwark, just beneath the open rail, and uprights connect it at front and back of the forecastle with the long strake below. Between the uprights, a narrower strake divides the fo'c'sle side into two panels. It is so placed as to continue the main-deck rail line. The next long strake starts at the beak rail, and continues aft the length of the ship, parallel to the strake above.

Another full-length strake starts at the top of the beak bulwarks and continues aft, parallel to the one above. The final strake, marking the water line, carries the line of the lower edge of the stem back in a gentle sweep to the point of greatest width at the stern, just above where the hull turns in sharply to form the stern lines. Instead of following the stem and hull lines it starts with a knee, roughly triangular in shape, forming additional bracing for the stem. Cut the knee to the shape shown, and carve or file down the edges to fit the lines of the stem and hull. Glue and pin it in place, and then fit the long strake. The final task on each side is to break up the top panel beneath the poop rail with five ornamental uprights. Cut a strip of basswood, 3/8 in. wide and 1/16 in. thick. At intervals of 3/8 in. along its center line drill 5/32-in. holes, and then, with a knife, cut off sections, slicing through the center line of each hole. The result is small pieces, somewhat like an hourglass in shape. Five are required for each side, placing them equally. Only two strakes are required across the stern, placed as shown. From the same stock, cut three pieces and glue and pin them across the break of the poop, quarter and fo'c'sle decks, flush with the deck line.

The cradle may be made at any time, but is handy to have before the rigging starts, as it keeps the boat upright. It is cut from 1/2-in. white pine, using two pieces 2 1/2 by 6 1/2 in. They are joined by two braces, 6 1/2 in. long, which may be made of round dowel stock, square, or, if

a lathe is available, turned to an attractive shape, as was done in the case of this model. The end members are cut as shown in the sketch. Find the center point on the keel, measure 3¼ in. each way and bend two pieces of radio bus wire or wire solder to shape around the keel and sides of the hull. Lay the wire down on the end members of the cradle, adjusting it so that it comes just within the ends, keeping the center on the center line of the wood. Mark along the inner edge of the wire with a pencil, and, with a coping saw, cut out the cradle. After it is assembled, final fitting can be done with a file. The cradle is completed by gluing strips of green or brown felt along the top and bottom surfaces.

The deck furniture comes next. The inside of the bulwarks and the ends of the poop, quarterdeck and forecastle should be painted at this stage, and windows and doors added. The color scheme decided on for this boat was light gray or white underbody, black upperworks, with a French gray or white panel below the rails, so a deeper, pure gray was used for deck furniture and the inside surfaces. The best results are obtained by using automobile paints ground in japan, and sold in 4-oz. tubes. The japan colors dry much quicker than paints mixed in oil, and this is emphasized by cutting the paints as they come from the tube with enough turpentine to make a thick cream.

The doors to deck house and forecastle are cut from the grained paper pasted on cigar boxes to imitate wood, and a narrow black border is painted around them to represent the frame. The windows are painted with black borders and crossbars, and aluminum paint, the kind that comes in powder form with a separate can of solvent, is used for glass, while the shadows are touched up with a dash of light blue in the corner of the glass.

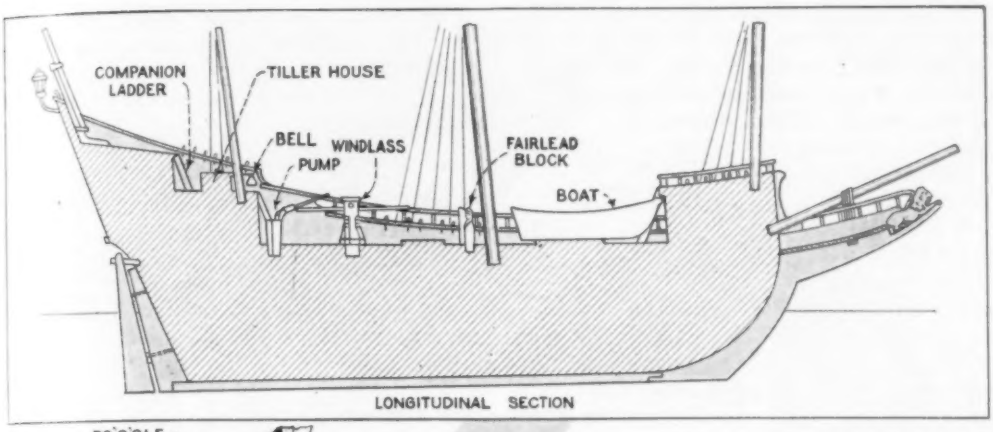
The deck furniture needed for this model includes four hatch covers, one windlass, a lifeboat, pump, a carved block and a bitt or bollard. The details of all are given in the sketches. The hatch covers are cut from ⅛-in. wood; their edges and a band around the top are painted black to represent the hatch coaming, and the center is painted a light brown, to represent time-worn and sea-stained canvas covers. The windlass and pump are made from pieces of ⅛ and 7/16-in. dowel stock. The base of the capstan is notched to take the pawls, which are cut from wood and glued to the deck (see deck plan). The pump handle is glued in the notched support which in turn is glued to the side of the upright barrel; a spout, cut from ⅛-in. dowel rod and hollowed out, is glued in a hole drilled in the side, and the inner end of the pump handle is fastened to a wire which passes down through a hole drilled through the center of the barrel.

The lifeboat can be whittled from a piece of 1-in. pine. The top is beveled down ⅛ in. on each side, and this surface painted the same brown as is used on the hatch covers, to represent the canvas cover. Lashing ropes are painted around the sides, and the underbody is white, with a black band around the gunwale. When assembled, the boat is lashed with black linen thread to short pins driven into the sides of the largest hatch cover, and the latter is then glued in place on the deck.

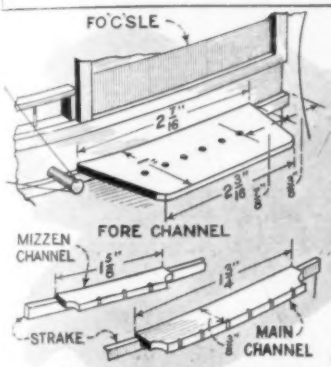
The carved figure or fairlead block that carries in its middle the block by which the main-yard lifts are led aft to the capstan, and from there to the belaying bitt, presented the greatest difficulty. Such carved figures were common on these old ships. The difficulty was finally solved when a set of tiny 1½ in. high Noah's-ark figures, carved from wood and painted, were found in a toy store. Two small holes were drilled through Noah's stomach, spacing them ⅛ in. apart, and the space between carved slightly, so that it resembled the pulley wheel of a block.

Three sets of ladders, to forecastle, quarter and poopdecks, complete the deck equipment. They are cut from 1/16 by 3/16-in. white pine. The ends are beveled off to fit deck and wall, and steps, ⅜ in. long, glued in place, each assembly being held together with the small clamps until the glue has set thoroughly.

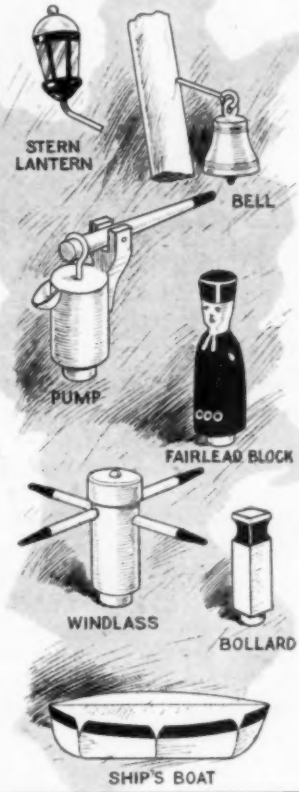
All the deck furniture is painted before being glued in place. Pure gray, the same as on the bulwarks, was used, with black for the ends of the pump handle and capstan bars, and the part of the bitt where the rope would chafe. The ladder treads were done in gray and the sides in black.



LONGITUDINAL SECTION



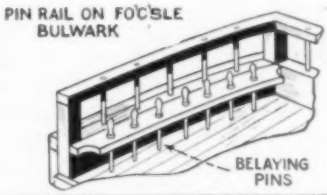
DETAILS OF CHANNELS

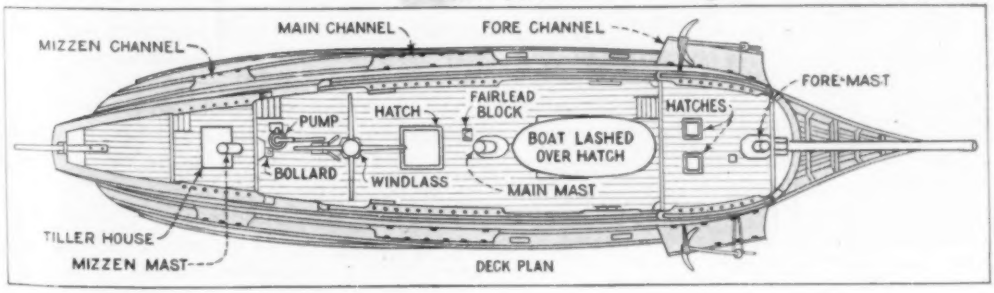


The deck plan shown will be sufficient guide for placing the furniture.

Pin rails, to carry the belaying pins, channels, through which the shrouds are fastened, guns, gun ports and port covers, and the ornaments of the stern, complete the work on the hull. There are three channels on each side, cut from 3/32-in. basswood, and glued and pinned in place in notches cut to half the width of the first strake below the main-deck line. Their position is shown in the plan view, and dimensions for cutting them are also given.

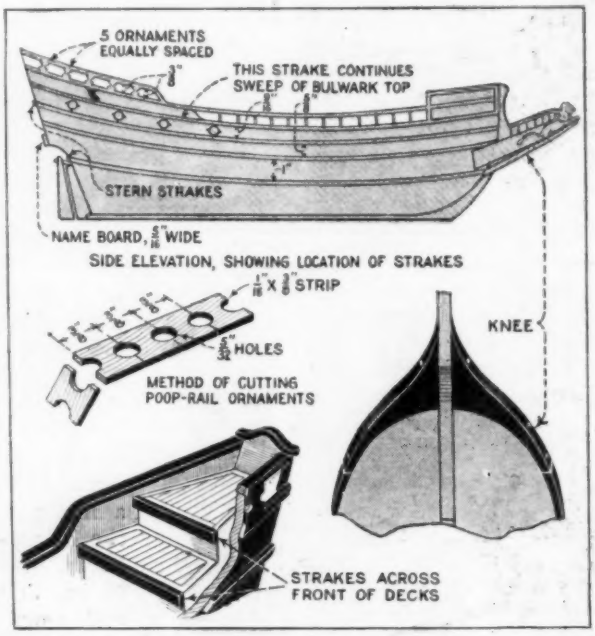
For the gun ports, draw a line straight down from the after end of the forecastle, then measure back 3/4 in., between the second and third strakes. That gives the front line of the open gun port. Lay out a 1/2-in. square, drill holes in each corner, 1/4 in. deep, and, with a chisel, cut out the port. The gun is made from 3/16-in. dowel stock, 3/4 in. long, 1/2 in. showing and





DECK PLAN

the other ¼ in. glued into a hole drilled in the back of the port. Paint the inside of the open port dark gray, gild the gun itself with gold enamel, and paint the tip of the muzzle either with black or silver paint. The port cover is ½ in. square, cut from ⅛-in. basswood. Drill a small hole near the edge in the center of one side and fasten a short piece of wire. Drill a No. 60 hole through the bulwark, just above the deck line, pass the wire through, twist the end to prevent its pulling out, and glue the other edge of the port cover to the top of the port opening, letting it stand out at an angle of 45 degrees.



The front edge of the second port cover is 2 in. aft of the rear edge of the open gun-port. The cover is cut to the same size as that for the open port, a similar wire lanyard attached and fastened through the bulwark, and the cover itself glued flat to the hull.

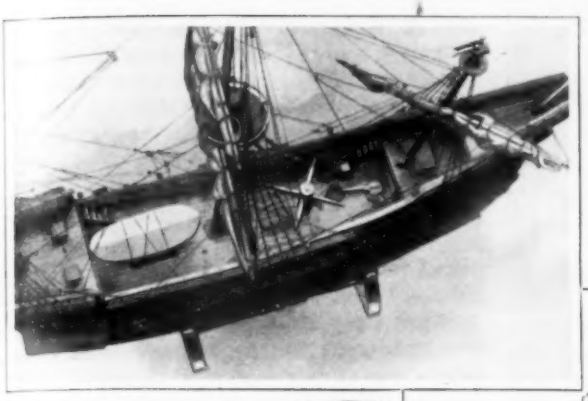
The pin rails are cut from ⅛ by ¼-in. basswood. The foremast rails run the length of the fo'c'sle deck on each side, and are glued and pinned to the bulwarks, flush with their top. The mainmast pin rails are 3½ in. long, and are fastened in the same way to the bulwarks of the main deck, their front end being 3¾ in. aft of the forecastle. The mizzenmast pin rails are 1¾ in. long and are fastened to the solid bulwarks of the poop, about ⅜ in. above the deck and approximately on the same line as the main-deck rail. Before attaching the pin rails drill No. 60 holes in them at ¼-in. intervals, to take the belaying pins, to which all the loose tackle ends later will be fastened.

The stern ornaments include a lamp, the half moon, two small shields and two windows, painted on port covers. The lamp, ⅝ in. thick at its greatest width and 1 3/16 in. high, can be cut from an ordinary cork, or carved from wood. A bead, glued to the top will serve as the ball. The five faces are cut down flat and painted with aluminum paint, to represent the glass, while narrow black lines between them take the place of the iron bars of the frame. The top is gilded, and the ball painted black, as is the base. Drill a No. 58 hole in the center of the base, and a corresponding hole in the stern bulwark, ⅜ in. below the rail top. Cut a short piece of wire, insert one end in the bulwark hole and the other in the lamp, and then bend it upward until the lamp is parallel to the stern.

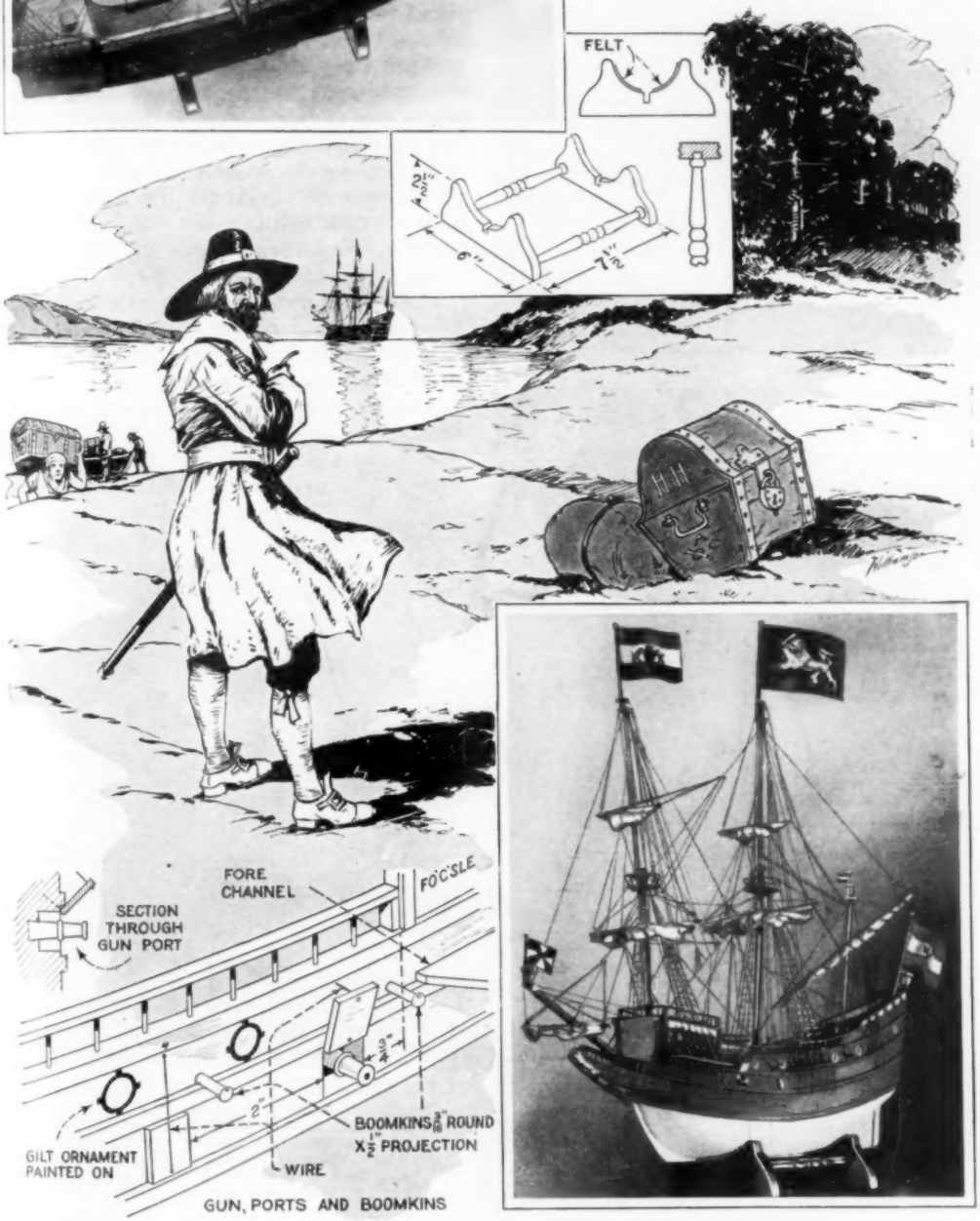
The half moon is sawed from a piece of 1/16-in. basswood. Gild it with gold paint and then add the eye, nose and mouth lines with black paint. The shields for the two coats of arms are cut from the same thickness of wood and painted red for the background, the lion on the one in gold, and the bend on the other in gold, with three small crosses of black. The windows are painted on ½-in. port covers with aluminum paint, set off with black borders and cross lines. (See the stern view in Part I.)

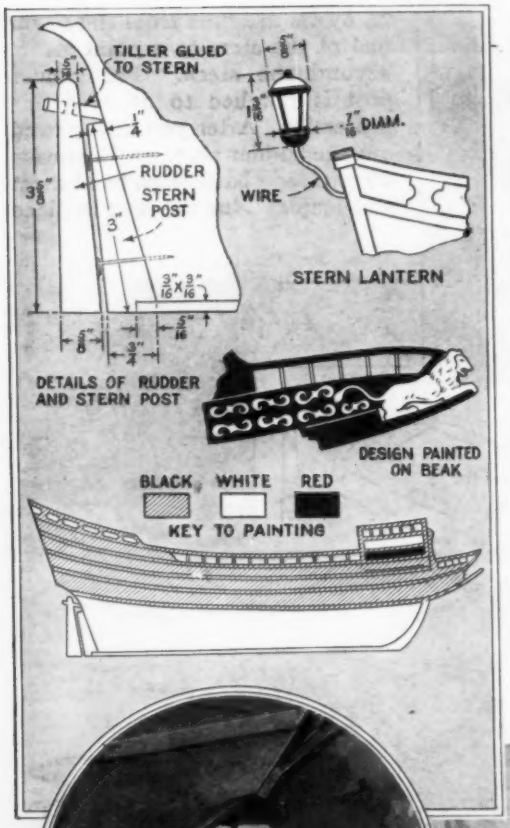
Beneath the windows, and just above the sharp break where the stern is cut inward, a name board, ¼ in. wide by ⅛ in. thick, is glued in place.

Add the keel, rudder and rudder post, made and fitted as shown, and you are ready to start painting the hull. The keel,



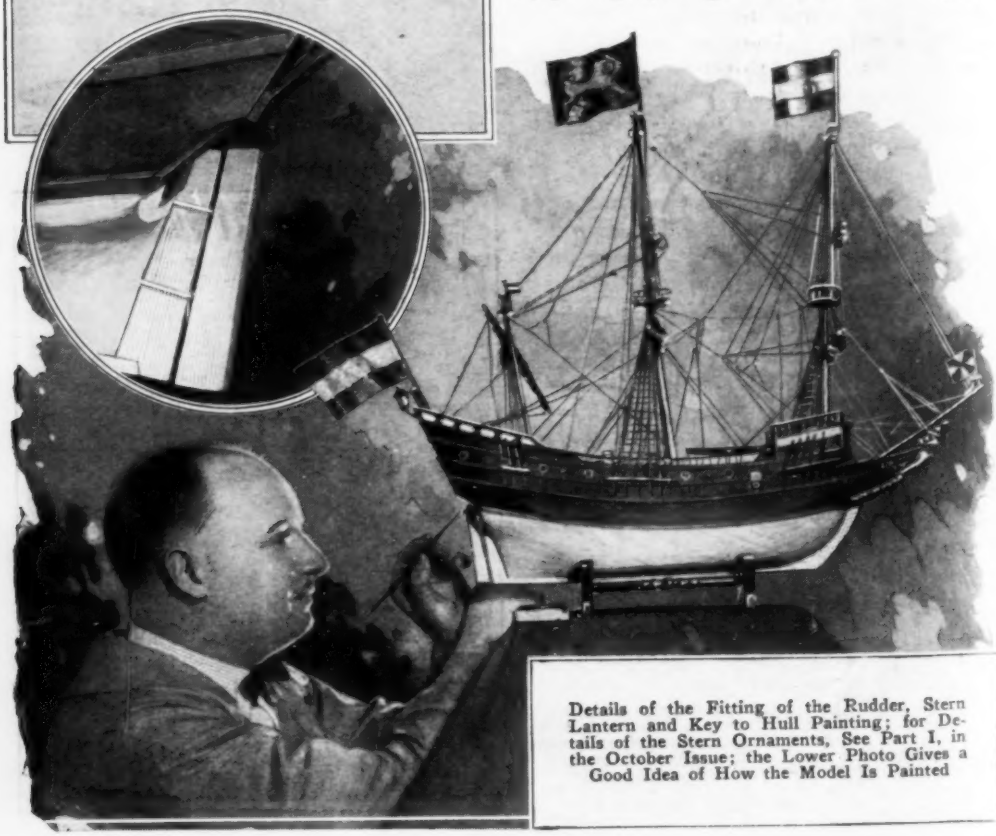
3/16 by 3/16 in., runs from the lower end of the stem to a point 5/16 in. beyond the stern. The rudder post is notched to fit over this projection. After you have sawed out the rudder post, cut the heads off two long bank pins, bend them into staples, glue the post in place





and then slip the staples around it and drive them into the hull. Leave the staples projecting slightly from the post until the rudder is attached. Cut the rudder, like the rudder post, from 3/16-in. basswood, drill a 3/32-in. hole through it to take the tiller bar, which is made in two sections, 3/16 in. wide and 1/8 in. thick. Round the ends to fit into the 3/32-in. hole, and glue them in. Next cut the heads from two common pins, bend them to form right angles, and drive the pointed ends into the rudder at the proper points so that, when the ends projecting downward are slipped into the staples around the rudder post, the lower end of the rudder will be on a line with the keel. Two more port covers, each 1/2-in. square, are glued on either side of the rudder, just below the water-line strake.

The boat is now ready for painting. The color scheme for this boat called for a light gray underbody, which was obtained by mixing French gray and a small amount of pure gray, to get a color which avoided



Details of the Fitting of the Rudder, Stern Lantern and Key to Hull Painting; for Details of the Stern Ornaments, See Part I, in the October Issue; the Lower Photo Gives a Good Idea of How the Model Is Painted

the chalky appearance of straight French gray. White can be used if desired. Underbody, stem up to the knees, and the rudder and rudder post below the waterline, were painted with this. The two port covers on the stern, below the painted water line, were done in black.

The upper part of the hull was painted a dead black, with the exception of the top panel on the poop and the two panels on the forecastle sides. The upper one of these, and the space between the ornaments on the poop panel, were painted with French gray, and the lower of the forecastle panels with the oriental red used on the coats of arms on the stern. The beak bulwarks and that part of the stem including the knees, which comes above the water line, were painted black, the figurehead was gilded, and two bands of gilded designs run, one along the beak bulwarks and the other along the stem, from the lion's tail back to the hull, filling in the space between the knees and the floor of the beak. Six gold ornaments were painted along the sides, as indicated in the sketches. These are simply ½-in. circles, with four projecting arms, forming the tips of a cross. The closed gun ports were given a narrow gold border to make them stand out from the hull.

The upper part of the stern requires more work. The bulwark rail, the edges down to the name plate, including the ends of the strakes, were given the effect of molding by painting a simple running design. The space around the half moon was broken up with four small gold stars, the name plate "Halve Maen" painted in gold, and the monogram of the company owning the boat, the Ostindische Cie van Amsterdam, painted between the two coats of arms, which represent the heraldic figures of the municipal arms of Amsterdam at the time of Hudson's adventures in America.

Next month's article will tell how to make the masts and spars and rig the ship.

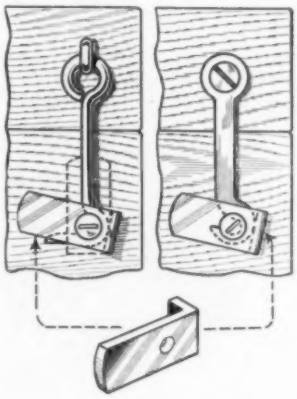
¶ If body vibration in your auto comes from the door panel or cowl, remove the upholstery, obtain some thick felt and cement it to the inside surface of the metal with thick shellac; this will nearly always remedy the trouble so that it ceases to be annoying.

Clip Keeps Notebook in Vest Pocket

Machinists, foremen, and others who carry a notebook or price list in their vest pocket, frequently lose them when stooping over. By obtaining an ordinary pencil clip and attaching it to the book, as shown in the drawing, this can be avoided, and it also prevents the book from falling to the bottom of a deep pocket.—A. Bereskin, Winnipeg, Can.

Safety Catch for Door Hook

Often it is desired to lock covers of boxes, doors and cupboards by means of ordinary hooks, and in cases where these might open by vibration or sudden jars, it is a good idea to provide a safety catch to prevent this. Get a brass plate, about the size, in proportion to the hook, shown in the illustration, bend it at right angles at one end and drill a hole in it as indicated. The screw on which the hook catches is removed and is then replaced with the brass plate in position. It must, of course, be free to turn easily. When the plate is held in the position indicated by the dotted lines of the left-hand detail, the hook can be slipped off the screw, but when in the horizontal position, to which it naturally falls by gravity, the hook is securely locked.

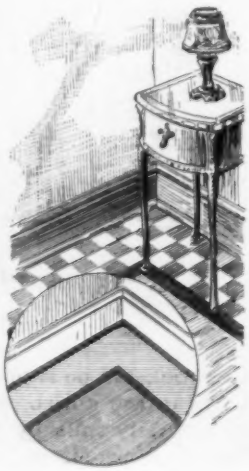


Ladder Repaired with Wire

If your ladder is at the stage where it threatens to give way when you are halfway up, it is well worth while to spend an hour repairing it. To do this, get a plow plane and groove a path along the sides of the two standards, making the groove about 3/16 in. deep. Next get some heavy galvanized-iron wire, insert it in the groove, and stretch it tight, using small staples to hold it in place. You can get the wire very tight if you take your time, and after the job is completed, you will find that your ladder is much stronger.

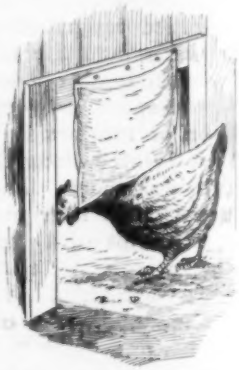
Floors Painted in Two Colors to Improve Appearance

In trying to improve the appearance of a worn softwood floor one usually tries to figure out what paint to use and what color would be most attractive. On this basis the paint is bought and the job done, the result being a more or less indifferent effect in a single color, which grows tiresome in time. The drawing shows methods of floor decoration, which have been followed out with pleasing effect. If nothing elaborate is desired, borders can be painted around the room that should be in lighter and darker colors contrasting to the rest of the floor. For example, a foot from the wall a strip, about 2 in. wide, is laid off and marked with a chalkline; the main floor space is painted gray, the border darker and the space between it and the baseboard, either a lighter or darker color as desired. Then there is the alternative of painting the space between the narrow border and the baseboard checker-fashion, in order to obtain something of the effect of marquetry flooring.



Disinfecting Poultry

A Wisconsin poultryman uses a novel and simple method for disinfecting the birds of his flock, as shown in the illustration. A cloth bag of coarse weave, somewhat similar to window-curtain material, is partly filled with disinfecting powder and this is tacked above the small door of the poultry house so that fowls entering or leaving the house must brush it with their backs. Each movement of the sack sifts a small quantity of the powder into their feathers, and, as the process is repeated many times each day, the thorough disinfection of each fowl is insured.



Don't Grease the Springs

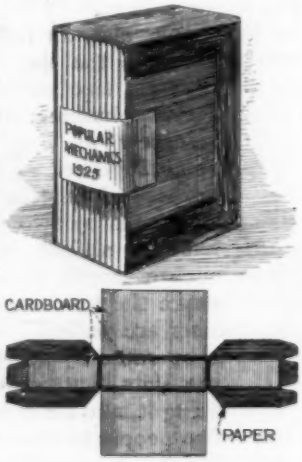
One of the things the automobile driver is prone to do in the attempt to make his car ride as easily as possible is to jack up the car, pry the spring leaves apart, and apply a liberal coating of grease or lubricating oil between the leaves. Some cars may be designed to use lubricant between the leaves; however, in the majority, this practice is not only unnecessary, but, in addition, is apt to ruin the riding qualities of the car for a considerable time. Most cars are designed and sprung so there must be friction between the leaves; not enough friction so that the car will ride hard or

squeak, but enough to give a cushioning effect and an easy spring action, instead of the oscillating action that a coil spring will give, for example. When the springs are lubricated the friction is destroyed, and the car bounces, and keeps on bouncing, when it passes over the slightest bump.

The only thing that is necessary to do with most springs is to keep them free from rust, and this may be accomplished by brushing a little penetrating oil, not lubricating oil, along the sides of the leaves occasionally. Spring covers are an excellent precaution against the entrance of moisture between the leaves, and they should be used wherever possible. Where the owner does not want to apply spring covers, on the score of expense, an excellent substitute can be made by wrapping the springs with a layer of black friction tape. This makes a close-fitting cover, and one that will wear for a long time. The last turns can be bound with a turn or two of wire, and the tape given a coat of enamel, to improve both the appearance and the moisture resistance. If in doubt whether the springs should be lubricated or not, write the manufacturer, but don't apply lubricant, until you know for sure that it will be of benefit.

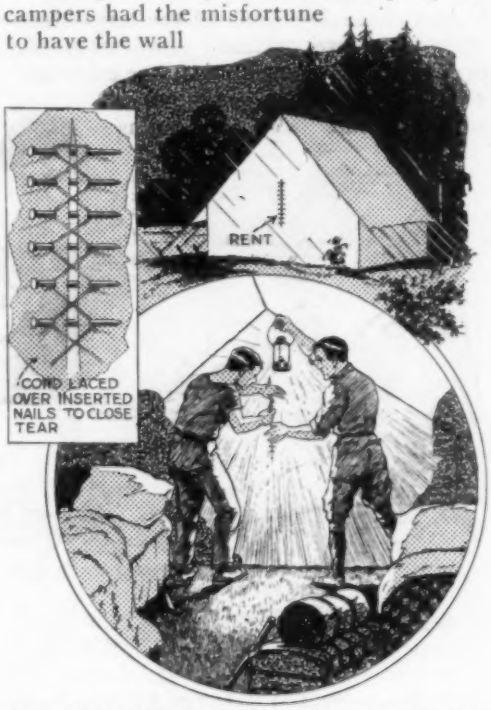
Cardboard Carton Files Magazines

Magazines can be kept together in neat cardboard cartons made to fit over them snugly. Get some heavy paper of the tough, brown fiber kind and cut it out as shown in the lower detail, reinforcing it by gluing on pieces of cardboard. The overlapping edges of the paper are then glued down over the sides, to form a carton. To keep a number of issues in the carton, remove the advertising and file the magazines in loose-leaf form.



Simple Repair for Torn Tent

During a heavy rainstorm a party of campers had the misfortune to have the wall of their tent torn and were at a loss to repair it as no needle was available. However, the rent was satisfactorily closed by means of nails, as shown in the drawing. The nails were stuck through the canvas from the inside across the rent, leaving the heads and points projecting so that a length of twine could be laced over them. In this way the edges of the canvas were drawn together. Had the nails been lacking, green twigs with sharpened ends might have been used quite as effectively.



Repairing a Torn Tent with Nails and Lacing from the Inside during a Rainstorm

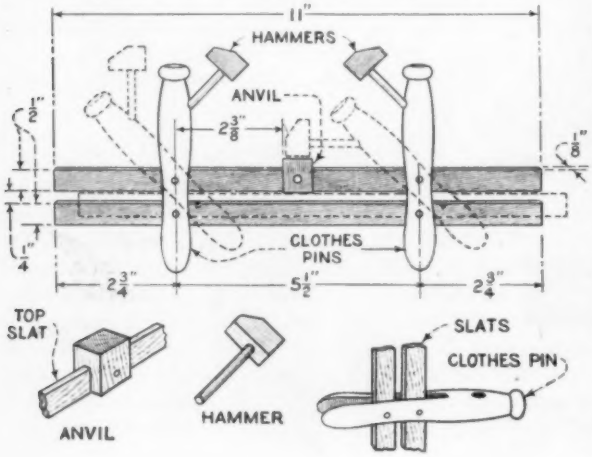
Test for Detecting Sewer Gas

If you suspect sewer gas but cannot readily determine whether it is that or some other odor, here is a good test: Soak a piece of white unglazed paper in a mixture of 1 oz. of lead acetate and a ½ pt. of rain or distilled water. When the paper is thoroughly dry place it in the suspicious locality and if sewer gas is present the paper will shortly turn dark.—L. B. Robbins, Harwich, Mass.

The Busy-Blacksmiths Toy Amuses Everyone

As the moving parts of the busy-blacksmiths toy are ordinary clothespins pivoted on short wooden slats, it is extremely easy to make it, and it will prove very popular. The clothespins are sandpapered smooth and are then carved and painted, or merely painted, to resemble men. Two ⅛-in. slats, ½ in. wide and 11 in. long, are also sandpapered smooth so that they will fit loosely between the slot in the clothespins, where they are attached with headless wire nails at points 5½ in. apart, as indicated in the drawing that shows the dimensions and constructional details. The slats are spaced about ¼ in. apart when their ends are in line. Holes are drilled in the clothespins at an angle to receive the hammers, which consist of small blocks whittled to shape with a jackknife, and short lengths of ⅛-in. dowel stock, or similar round pieces, carved from any piece of wood. Glue is used to hold the handles of the hammers in the clothespins and in the hammer heads. The anvil is attached to the upper slat, as indicated, it being cut to straddle the slat and then nailed on. Its size should be such that the two hammers will strike it alternately at the time the slats come together as they are pulled or pushed lengthwise in opposite directions by two playmates. The hammer shanks must also be of such a length that the heads will strike the anvil squarely when the slats are pulled. Usually this toy is operated by grasping the end of the slats, but another method of using it is to set it on the table with two people to operate it. It is also possible to run this toy with a small engine. In that case, the bottom slat should be fastened rigidly to

Busy-Blacksmiths Toy, Made from Thin Wooden Slats and Ordinary Clothespins, Is Easy to Construct, and Will Prove a Popular Number with Children



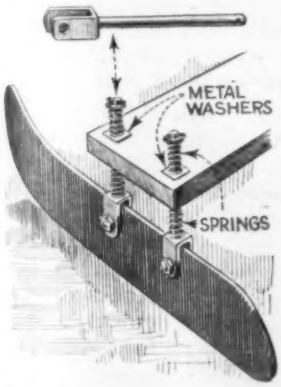
a wooden base and the upper slat joined with a connecting rod to the flywheel of the motor. A toy of this type is strong and will afford endless amusement for the children.

How to Detect Rosin Varnish

It does not take long to learn that varnish containing rosin is a very inferior grade. The best test to detect a rosin varnish is to rub the ball of the finger over it. If the varnish used is of good quality, the shine of the polish will be increased, but if it is rosin varnish, the rubbed spot will appear dull. This proves that rosin varnish is not hard enough to withstand wear of any kind. One should always be sure, when buying varnish, to get the best. Naturally the cheapness of rosin varnish has brought it into use in many homes, which have been built for price and not for service. It will pay anyone to avoid anything in varnishes which has a rosin base, for it will be ruined by water.—L. H. Georger, Buffalo, N. Y.

Shock-Absorbing Iceboat Runners

The usual method of fastening iceboat runners is to use a single bolt through the runner and the chock, which gives no resiliency whatever, and results in making the iceboat travel uncomfortably. The method shown in the illustration involves the use of two iron chocks for each runner.



Long bolts are welded to the chocks to stand vertically. The bolts are slipped through holes drilled in the ends of the runner plank, and steel coil springs are provided above and below the plank to serve as shock absorbers. A washer and cotter pin at the upper end of each bolt, above the top spring, keep the runners in position securely.

Fountain Provides Water for Dogs

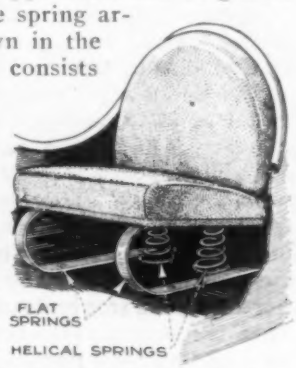
A plumber of Huron, S. Dak, arranged a water fountain in the street to provide water for dogs. A square depression,

Overflow of Water Fountain Provides for Thirsty Dogs in Sidewalk Depression

about 4 in. deep, was made in the concrete next to the curb. During the summer months the overflow from the fountain was directed into it, the recess itself having an overflow into the gutter. People continually using the fountain kept the depression full of fresh water.—Frank W. Bentley, Jr., Missouri Valley, Iowa.

Spring Construction for Seat of Racing Auto

Additional riding comfort on bucket seats for racing-type autos can be gained by providing the spring arrangement shown in the illustration. It consists of two U-shaped supports, made from old carriage springs, which are drilled at the ends for bolts, and bent at the centers. To obtain the required stiffness, two or more helical springs are attached to the flat springs as indicated.—G. A. Luers, Washington, D. C.



Swing for Indoor or Outdoor Use Is Adjustable and Can Be Used Also as a Trapeze

Combined Swing and Trapeze Adjustable for Children of Various Ages

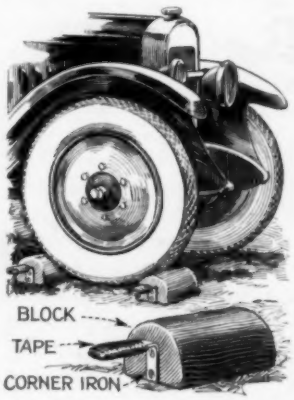
All youngsters love to swing. The problem of making one swing serve for children of various ages and sizes was solved in the following manner: A sufficient length of 7/8-in. manila rope, two 25-cent swivel rope hitches, a pair of iron rings and a plain-board seat were obtained. If available, a pair of swinging rings, such as are shown in the photo, come in handy but are not essential. The height of the seat can be regulated by lengthening or shortening the free ends of the suspension ropes through the hitches. The advantages of the latter are that they do away with the tying of knots, are easily adjusted and do not slip as a carelessly tied knot may do. By removing the seat and raising the rings a swinging trapeze is formed which is much enjoyed by children, as well as adults. The swing can be arranged either indoors or outdoors.—Elizabeth S. Friedman, Washington, D. C.

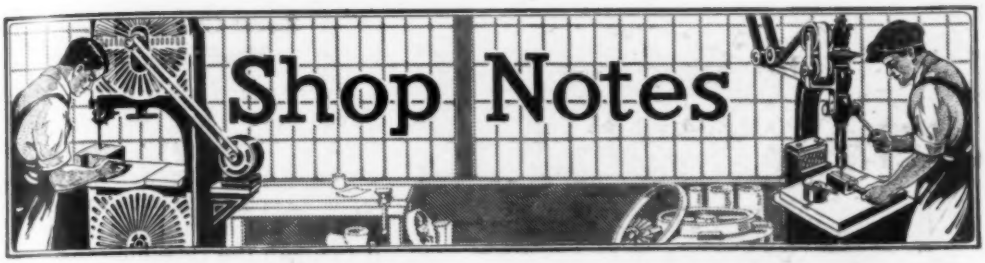
Refinishing Old Canvas Canoes

Canvas canoes, which have been painted from year to year with all the colors of the rainbow, sometimes need a good treatment of paint remover. To get rid of the coats of old paint without damage to the canvas offers a problem to many, but can be done in the following way: Apply any good paint or varnish remover and allow it to stand 10 minutes; then use a scrubbing brush dipped in gasoline. This should be done outdoors where there is plenty circulation of air. Never use a putty knife, as this has put more holes in canvas canoes than any other method of removing paint. A stiff scrubbing brush or large-size nail brush will do the work nicely. A little hard work with the brush and gasoline and paint remover will prove far more efficient than any other method, as the chance of slipping and cutting holes is eliminated.—L. Georger, Buffalo, N. Y.

Safety Blocks Hold Auto Wheels

It is rather a serious matter if any of the cars fitted with disk or wire wheels run off the jack when changing wheels. To prevent this, it is a good plan to carry a pair of half-round wooden blocks, about 5 by 8 in., as shown in the drawing. The blocks can be quickly placed in front and behind one of the wheels. A handle can be made of a large corner iron, nailed or screwed to the end of each block and wrapped with tape. The handles allow the blocks to be placed without danger of pinching the fingers.



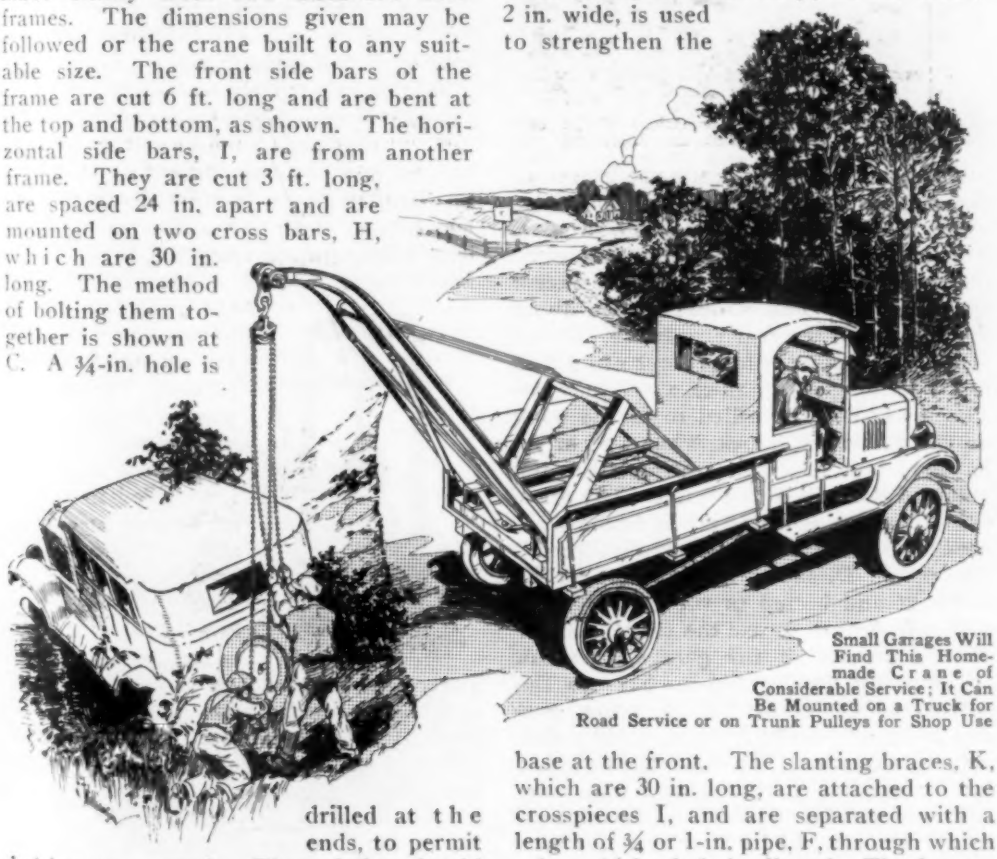


All Shop Notes published in 1925, in book form—Fifty Cents—from our Book Department

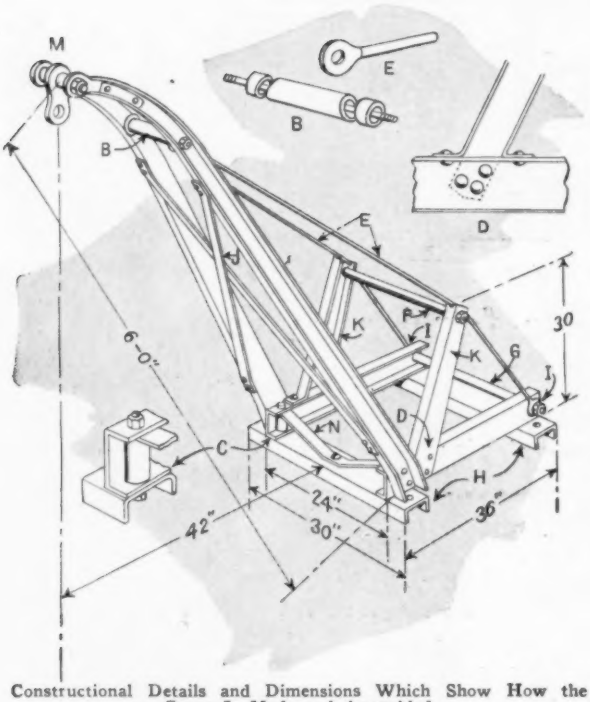
Wrecking Crane for Small Garage

By GEO. H. CAPPEL

NOWADAYS it is almost a necessity for every garage to have a wrecking crane and a good serviceable crane can readily be built by any enterprising mechanic. The drawing shows one which is made chiefly from two discarded auto frames. The dimensions given may be followed or the crane built to any suitable size. The front side bars of the frame are cut 6 ft. long and are bent at the top and bottom, as shown. The horizontal side bars, I, are from another frame. They are cut 3 ft. long, are spaced 24 in. apart and are mounted on two cross bars, H, which are 30 in. long. The method of bolting them together is shown at C. A ¾-in. hole is drilled at the ends, to permit bolting to a truck. These holes should be drilled 28½ in. center to center if the crane is to be used on a Ford truck. Long ¾-in. bolts and a piece of ¾ or 1-in. gas pipe, cut to fit between the inside of the channels, keep the frame from drawing together and make a tight connection when the bolts are drawn up tight. A front cross brace, N, made of ¼-in. flat stock, 2 in. wide, is used to strengthen the base at the front. The slanting braces, K, which are 30 in. long, are attached to the crosspieces I, and are separated with a length of ¾ or 1-in. pipe, F, through which a long ¾ in. bolt is slipped. The braces, K, serve as a rest for the round-iron braces, E, which are attached last. The



Small Garages Will Find This Home-made Crane of Considerable Service; It Can Be Mounted on a Truck for Road Service or on Trunk Pulleys for Shop Use



Constructional Details and Dimensions Which Show How the Crane Is Made and Assembled

main members of the crane are braced as shown with flat crosspieces, J. The crosspiece, B, like F and G, consists of a ¾-in. bolt and a ¾ or 1-in. pipe. This completes the framework of the crane except the head, M. This should extend about 3½ ft. beyond the rear crosspiece, H. An eye or hook plate is forged out of an iron bar, 6 in. long, ¾ in. thick and 3 in. wide. The lower hole is drilled to fit the hook on the differential block, while a ¾ or ⅞-in. steel bolt is slipped through the top hole and the ends of the frame. The brace rods, E, are attached after the frame is assembled so that they will have a tight fit. The detail, D, shows how the braces, K, are bent and bolted to the cross bars I.

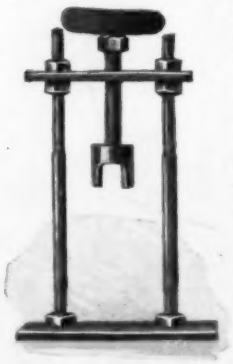
If it is desired to use the crane also for general service in the garage, this can be done by bolting 6½-in. bars to the bottom of the crane. Large trunk pulleys are used for the front end and a caster at the rear end. In this way the crane can be used in the shop and only four bolts are needed to attach it to the pulleys. When used as a floor crane, it may be found desirable to weight the caster end. For light lifts, of course, this is unnecessary.

Sweet-Clover Stems Used for Feed

Every year I allow a part of my sweet-clover crop to seed, and then I harvest the seed. The stems of the clover then have become so large and hard that stock will eat but little of it. Running it through the threshing machine breaks up the stems so that they can be fed into a grinder made for handling ear corn, and last winter we ground about 40 bu. of clover straw. When mixed with oats or other ground feed, it is relished by stock and appears to have considerable food value.—Geo. G. McVicker, North Bend, Nebraska.

Valve-Cage Tool Adjustable for Height

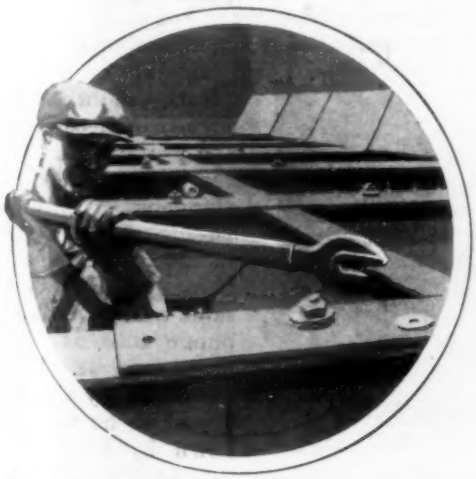
To release the pressure while removing spring-washer locks from valve stems, the illustrated tool will be found useful. It consists of one piece of ¼ by 3-in. steel, 5½ in. long, and two ⅜ by 9-in. steel rods, which have been threaded 1 in. of their length at the lower ends and 3½ in. at the upper ends. Six ⅜-in. nuts are used on the rods, as shown, to properly locate the upper and lower plates. The upper plate is of ¼ by 2-in. steel and is 4¾ in. long, two holes being drilled in it, 3¼ in. center to center, and two holes drilled and tapped in the base the same distance apart. In the center of the upper plate, a ½-in. standard thread is tapped in which is fitted a 3-in. capscrew, with a piece of ⅛ by ¾-in. steel, 2¾ in. long, to form a thumbscrew handle. To the lower end of the capscrew is fitted a spring-washer release, made from 1 1/16-in. stock, 1¼ in. long, with a 13/16-in. hole drilled in the center. A cross slot, ⅝ in. wide, is cut as shown in the photo, and the piece is then joined to the capscrew by reducing



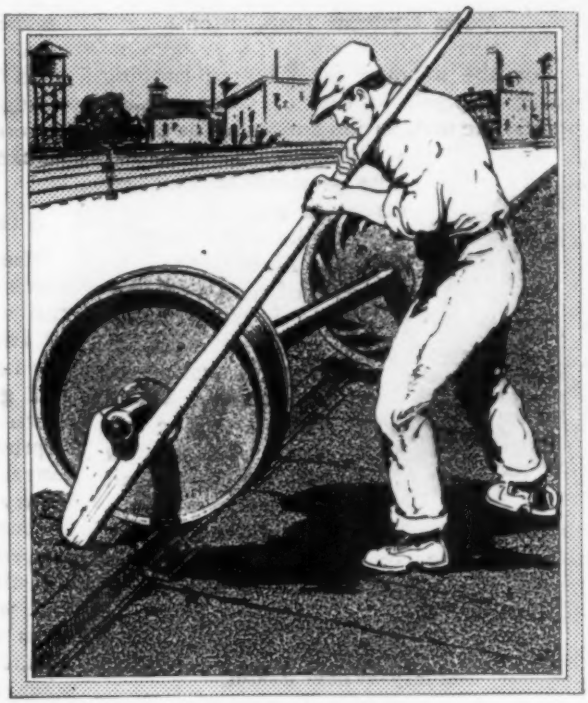
the end of the screw to 5/16 in. in diameter for a distance of 3/8 in. A 5/16-in. hole is drilled in the solid end of the spring-washer release and the end of the capscrew is riveted over, to prevent the washer release from coming off the screw. This makes a satisfactory cage tool as it holds the valve spring in whatever position desired and is adjustable to cages of all heights within its capacity.

Homemade Tool for Straightening Steel Flanges

Straightening steel flanges is usually done with a sledge hammer, the metal being well heated to make the work easier. In a Denver steel shop, where a great deal of repair work is done, a special tool was made for this purpose. It was made from a No. 4 alligator wrench and has been found indispensable for straightening steel flanges 1/2 in. or less in thickness. The wrenches are heated in a forge and closed to a 3/4-in. gap. A 2 or 3-ft. section of 1 1/2-in. gas pipe is slipped well up on the handle of the wrench, hammered down and welded. With this tool a workman may straighten flanges up to 1/2 in. cold, without the muscle shock occasioned by the use of a sledge.—Jos. C. Coyle, Denver, Colo.



Straightening Steel Flanges Up to Half-Inch Thick without Heat with Specially Made Tool



Handy Wooden Jack Facilitates Handling Railway Trucks over Tracks and in Shops

Handling Railway Trucks Easily

In rolling a pair of railway trucks it is difficult to change the course in which the wheels are rolling and to get them across tracks with the unaided hands. The jack shown in the drawing has been found very helpful in this task. A hardwood handle, resembling that of a peavey, but heavier at the lower end, has a triangular block of hardwood, 3 in. thick, spiked to the lower end. The upper end of the block, which is 4 in. wide, is curved to fit the axle of the truck. With the handle set vertically on the ground, the top of the block should be about 3 in. higher than the underside of the axle. In use, the jack is passed under the axle, and when the handle is pushed forward, the axle will be lifted and carried ahead. One man can turn or run a pair of trucks over the track with this jack.

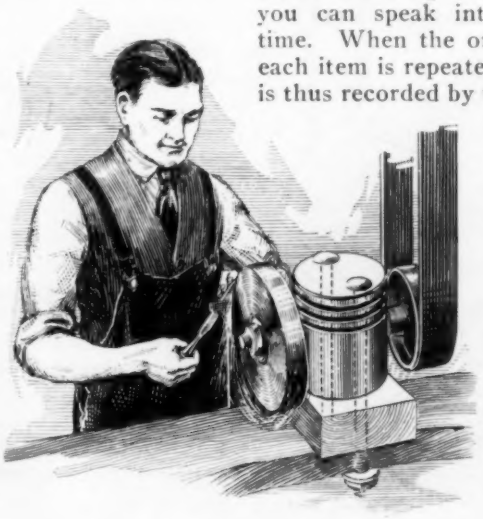
¶When babbitt metal has been heated repeatedly, the tin and antimony are partly burned out making it unsuitable for use for bearings, etc.; oxidation is indicated by the formation of scum on the surface.

Good Hydrant Installation

For the average farm where running water is piped to two or three outside points, the installation shown in the photo will prove satisfactory. The shut-off is set far enough underground to prevent its freezing in winter. Then this is covered with a column of 4-in. bell tile, and the stack is brought just above the ground with the bell of the last section of tile on top. A ½-gal. pail cover just fits into the bell, and a hole punched through the center of the cover will then make the installation complete.—Dale R. Van Horn, Walton, Nebr.

Emery-Wheel Stand

The emery-wheel stand shown in the drawing is made from an old piston which had been discarded from an automobile engine. It is mounted on the bench top by two long bolts, as shown. A wood block is placed between the bench and the piston to make it stand at the proper height. The wristpin bushings are left in the piston and serve as bearings for the shaft. The latter should be the right size to fit nicely in the bushings, and long enough to mount an emery wheel on one end and a pulley on the other. The end that carries the wheel can be threaded and the wheel clamped between two nuts, while the pulley is fastened with a key or a setscrew. A stand of this kind will carry a good-sized wheel, as considerable bearing surface is provided by the wristpin bushings. In drilling the holes for the bolts, it is of importance to place them far enough apart so that the bolts will not interfere with the shaft.—Harold Jackson, Kankakee, Ill.



Serviceable Bench Stand for Emery Wheel Is Made from Old Piston

Altered Machine Tap Works Better

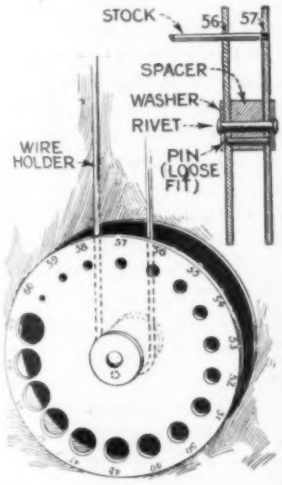
The machine tap will run into the work much more readily and will not break so easily if it is altered as indicated. Take any tap with four flutes and grind the threads down one-half of their depth on two opposite flutes. Whereas the ordinary tap would usually break after I had tapped about 90 holes, the altered tool tapped 450 without breakage. It is evident that this meant quite a saving where thousands of holes had to be tapped. —Arthur Whittier, Norwood, Mass.

New Use for Dictaphone

The dictaphone can be used to record orders for merchandise arriving by long-distance telephone. To do this, hold the mouthpiece of the dictaphone directly under the telephone transmitter so that you can speak into both at the same time. When the order starts coming in, each item is repeated to the customer and is thus recorded by the dictaphone. Shipping directions, terms and other information needed for the prompt and correct billing of the shipment may also be included. This method insures accuracy and at the same time saves telephone tolls as the order can be taken more quickly than if it had to be written down by hand.—M. W. Lowry, Athens, Georgia.

Improved Drill and Wire Gauge

A single drilled plate is the common form of drill and wire gauge, but a better instrument is obtained by using two plates as shown in the drawing. The difference in diameter of the drills is so slight that it requires close gauging to determine the exact number, and users of the single-plate gauge ordinarily try the next smaller hole as a check after the drill has been fitted, for, if this is not done, the drill or wire may be passed as a size larger than it is. The double-plate gauge, however, prevents mistakes of this kind and saves the time required to pull out the work and try it in the next hole. To make it, two plates were drilled together from the smallest to the largest size. After drilling, a spacing piece was pinned between the two plates and the pin riveted over on both sides. The riveting is not done until the plates are tight and is stopped when the plates are held snugly but movably on the pin. Next the back plate is moved around one hole, which brings the next smaller holes in line with the holes in the upper plate. In this position a hole is drilled through both plates and the spacer, and a loose pin inserted. In use, the gauge is suspended by a wire holder from a nail or hook in the wall so that it can be spun around to bring the required hole to the most convenient position. The work is tried in the holes until it enters the one it seems to fit best. It is then pushed farther through to try it in the next smaller hole, which is in line with it in the back plate. If it fails to enter this, its size corresponds with the number of the hole it entered.



Special Frame for Holding Dump Doors Aids Riveters

Support for Dump Doors Makes Riveting Easier

The device shown here was originated at the shops of a western railroad for holding dump doors of ore cars, as well as other broad, flat steel equipment, while riveting them. It is made of 4 by 6-in. timbers, securely bolted together in an A-shape and reinforced at the bottom with steel straps, which are turned up near the end of the two timbers that form the base of the device, to keep the doors from slipping. It is 3½ ft. in height, and the base timbers are the same length, which makes it convenient for the crew to stand in an easy position while performing their task with the rivet gun and the bucking bar. —Jos. C. Coyle, Denver, Colo.

Keeping Soldering Kit Handy

The electrician, tinsmith or other mechanic, who is often compelled to work in low attics or other small spaces, will find the illustrated stunt of providing pockets on the side of the blowtorch of considerable convenience, as it serves to keep the solder, flux, tape, etc., at hand and less likely to be mislaid.

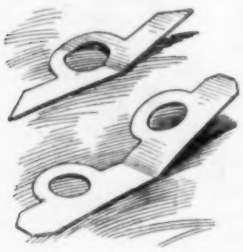
Simple Automatic Counter Attached to Frame of Roller Conveyor Is Found Dependable

Simple Counter for Roller Conveyor

The drawing shows a simple method of attaching a counter to a roller conveyor. The counter is placed on a bracket attached to the frame of the conveyor at a turn, and should be located on the outside of the curve, for the reason that there will be greater separation between the units at this point than elsewhere. The operating lever is made from light bar stock and is actuated by a spring attached to the counter arm, which can be swung out of the way instantly whenever desired. —J. S. Hagans, Chicago, Ill.

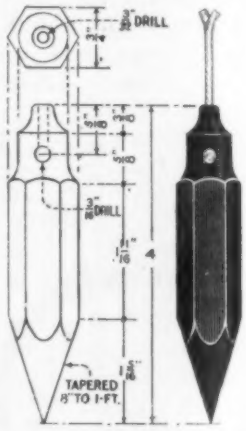
Handling Bearing Shims

While working under the car on the main bearings, it is sometimes discouraging to have the thin shims slip off the bolts and scatter on the floor. A good method of preventing this is to bend the shims in the center slightly. Shims having a single hole are bent across the hole as shown in the upper detail. Those having two holes are bent between the holes as shown below. Take care that the ends point up so that, when the bearing cap is replaced, the shim is smoothed out and the bending has no effect upon the fitting of the bearing. By replacing the heavier shims first, the thin ones will serve to hold all of them in place until the bearing cap is started over the bolts.—S. J. Gee, Montpelier, Idaho.



A Homemade Plumb Bob

Get a piece of cold-drawn steel, hexagon in shape, 4¼ in. long and ¾ in. wide. Lay out and center-punch for a 3/16-in. hole near the top end, according to dimensions given in the drawing. In locating this hole allow for 1/32 in. to be faced off at the end. After the hole has been drilled, set up the work in the lathe. Place it in a three-jaw universal chuck, with the drilled end of the work extending 1½ in. Adjust it so that it runs true. Now arrange the belt for the proper spindle speed, set the lathe tool for facing and face the end. Center the end of the work with the centering tool held in the toolpost. Center-drill this end as indicated, using a center drill with a 3/32-in. pilot drill, and drill a 3/32-in. hole in the end to intersect the 3/16-in. hole. Remove the drill chuck from the tailstock spindle, insert the hardened center and adjust the tailstock so that it will support the end of the work. Get a round-nose tool, ground to form the fillet at the end, and turn down to two diameters as indicated. Round the corner at the end with a file and polish the machined surfaces with a piece of emery cloth. Now turn the work around in the chuck so that it extends 1¾ in. True it as before and set the compound rest at a 108° angle, reading from the headstock side, with the handle toward the tailstock. Then turn down the work to a point and finish with emery cloth.

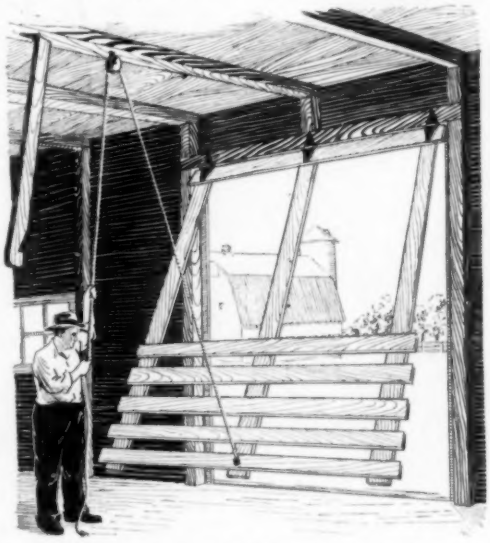


Keeping the Closed Car Warm

As cold weather approaches, the motorist is faced with the problem of keeping the car warm. The quantity of cold air that comes in through the floorboards and around the windows is surprising. This is especially true when the car is in motion. As the heat from the engine naturally escapes through the vents on the sides of the hood, one auto owner conserved a great deal of this heat by closing up these vents on the inside of the hood with two strips of cardboard, so that the fan blew the heated air from around the motor back against the floorboards, thus aiding in heating the inside of the car. The strips were held in place with no fastenings by simply bending the ends out through the first and last slot in the hood.

Gate Keeps Stock Safe and Ventilates Barn

To prevent the escape of stock from the barn and yet provide proper ventilation during the hot months, one farmer built a slat gate, hinged at the top as shown in the illustration. This gate is made of several 1 by 6-in. boards nailed to three vertical pieces, which are long enough to reach from the door sill to the top of the opening, where they are nailed to another horizontal piece, hinged to the top of the opening. A rope runs from the bottom of the gate over a pulley fastened to a ceiling joist at the proper distance inside, and a pull on this rope opens the gate. There is also an automatic lock, made of a 2 by 4-in. piece, 3 ft. long. This is hinged to the ceiling and has a notch, which engages with the lower edge of the gate when it is raised. The lower end of this lock is within reach.



Gate with Hinges at the Top Keeps the Stock in the Barn and Provides Plenty of Ventilation

Triangle Fitted to Be Used as T-Square

There are a great many instances where it is necessary to make rough sketches and where a little accuracy is of considerable value in future work. The drawing shows how a medium-sized triangle was made to do double duty. A short strip of heavy celluloid was slotted to give a snug fit on the edge of the triangle so that it could be removed when not needed. The method of using the device is clearly shown in the illustration.—L. H. Georger, Buffalo, N. Y.

Protection for Stucco-Finished Houses against Water Stains

Stucco should never start closer than 8 or 10 in. to the ground line. Splashing from rains will otherwise be sure to discolor it and cover it with dirt or soot, which lies on the surface of snowbanks next to the house walls. Another blemish often seen on stucco finish is discoloration just below the windows, such as rust from screens and windows. Extra-wide sills or sills with a groove or other trough-shaped depression near each end to force the water to run off through them are the best means to prevent this trouble.—Geo. G. McVicker, North Bend, Nebr.

¶ Chicks hatched in the middle of March will be early layers.

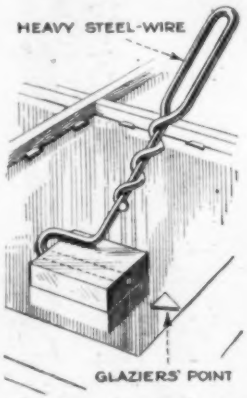
Old Hammers Drawn Out Make Good Tools for Removing Rivets

Tool for Backing Out Rivets Made from Old Hammer

In a large Denver shop old hammers which have become chipped and unsafe for use are drawn out to a ¾-in. point, as shown in the photo, and are used for backing out old rivets, after the head has been removed with an air chisel. The "backout," as it is called, may be held safely upon a rivet by one workman while it is being struck with a sledge by a second man.—Jos. C. Coyle, Denver, Colo.

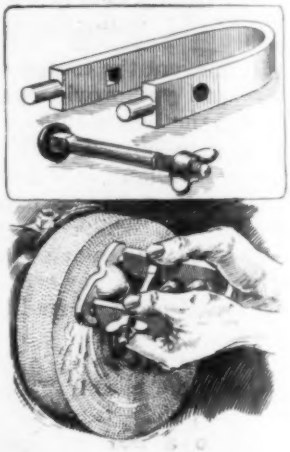
Handy Mallet for Glaziers

Glaziers and others who have occasion to reglaze windows and doors will find the mallet shown in the drawing of considerable assistance in their work. It consists of a piece of flat steel, squared and polished, through which a hole is drilled from end to end to receive a length of heavy steel wire. The hole is countersunk at one end to permit the end of the wire to be clinched without projecting beyond the side of the head. The wire is bent as indicated, to form a handle, and should fit rather loosely in the hole. Thus, the head of the mallet will always lie flat against the glass no matter at what angle the handle is held in driving the points. In many shops beveled chisels or other similar tools are used for this purpose, but this tool will be found much more valuable and well worth the time required to make it.—G. E. Hendrickson, Argyle, Wis.



Holder Helps in Grinding Bearing Caps

Grinding bearing caps on an emery wheel is a job that requires care in order to get the flat surface of the cap ground evenly. A simple holder, which can be made in a short time and makes the work much easier, is shown in the illustration. It consists of a length of flat steel, bent to a U-shape and having the ends ground to fit in the bolt holes of the caps. Two holes are drilled through the sides of the holder to receive a bolt, which is provided with a wingnut to tighten it so that the holder will grip the bearing securely. In this way, a comfortable grip is obtained, and at the same time the fingers are protected from the surface of the emery wheel.—G. A. Luers, Washington, D. C.



Waterproof Varnish for Wooden Trays

Wooden trays are often built for darkroom or laboratory use. To make them waterproof, yet chemically clean, is a simple matter if the following coating is applied: Melt ½ lb. of common brown rosin and add 2 oz. of yellow-wax chips, stirring the mixture until it is smooth. This will fill all cracks and pores and will render the wood absolutely non-porous. —L. B. Robbins, Harwich, Mass.

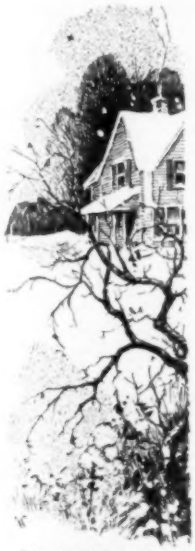
Improving Your Hot-Air Furnace

By J. TATE

ACCORDING to a well-known heating engineer, it is possible, by a few simple and inexpensive changes, to effect a saving of 20 to 30 per cent in the coal required to heat a house in severe weather, where a hot-air furnace is used for heating. "In fact," he says, "it is easy to change hot-air house heating from a system markedly inferior to steam or hot-water apparatus to a system that compares very favorably with them in nearly all respects."

It may not be possible for all readers to realize the saving mentioned above, for some of the improvements indicated later may already be incorporated in their own furnaces, but there are many installations where the full amount may really be saved.

The first simple improvement possible to make in the majority of hot-air furnaces is that of a simple apparatus for humidifying the warm air supplied to the rooms. The desirability of maintaining a reasonable amount of moisture in the air of the average home is recognized by all heating and ventilating authorities; it is, in fact, essential to health, protection of woodwork in the house and economy of fuel. Where sufficient moisture is present in the air, the temperature of the rooms can be kept at a lower point than when the air is dry, with equal comfort to the occupants, and a lower temperature means a saving in coal to begin with. In addition to this, if the air is dry, moisture is evaporated from the woodwork of the house and the furniture, with more or less disastrous effects, and the effect on the occupants is no less bad from the standpoint of health. Fortunately, it is comparatively easy to humidify the air in a hot-air furnace, much easier than it is to do the same thing in a house heated with steam or hot water. Do not, however, rely on the cast-iron water pan fitted to many furnaces to do the work, for it will not. There is only one place to fit a humidifying pan in the average hot-air furnace, and that is on top of the radiator or heating



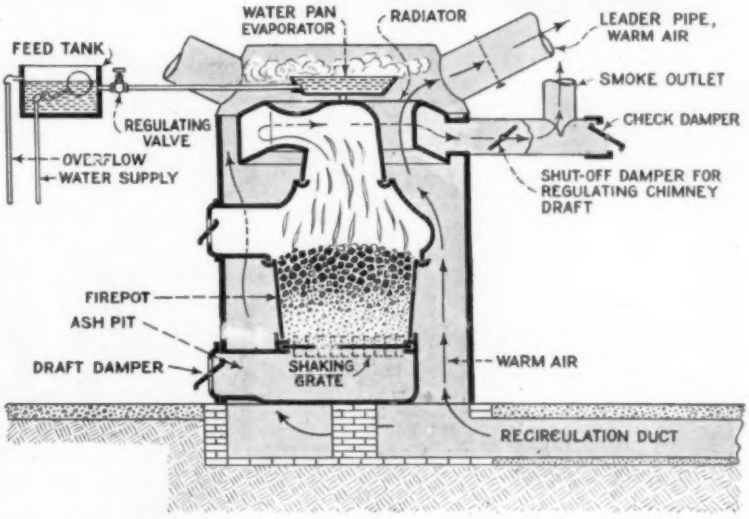


Fig. 1

The Addition of a Simple Humidifying System to the Hot-Air Furnace Not Only Adds to the Comfort of the Home Owner, but Helps Save Coal

drum, just beneath the bonnet of the furnace. The installation of such a pan, which should be of cast iron, is shown in Fig. 1. To make the tank function without attention, an automatic ball cock is arranged in an external tank to keep the pan in the furnace constantly supplied with water. A regulating valve is fitted in the supply line leading to the furnace pan, and an overflow pipe to the external tank. In extreme weather, when the furnace is running at full capacity, the regulating valve must be closed somewhat, in order that the air in the house may not become too saturated and the windows covered with frost. The only thing to watch in fitting such a humidifier is to keep the water level in the float tank at the same level as is required for the furnace pan.

The next thing to consider is whether the cold-air supply to the furnace is taken entirely from outdoors. If it is, that means that all the air handled by the furnace must be raised from the temperature prevailing outdoors to the temperature required for the house. In very cold or windy weather, the temperature difference is very considerable, and a lot of coal is needed to raise the temperature of the air to the higher level. This can be avoided almost entirely by the addition of a recirculation duct, through which all or a part of the air to be heated is taken from the interior of the house. Many furnaces are now fitted in this way, but many old ones are not, and it makes a considerable difference in the amount of coal burned in cold weather, and often a very appreciable difference in the comfort of the house, whether the air must be raised from zero or below to 68 or 70°, or from 50 to the same degree.

One heating engineer solved the problem in his own house by using a recirculation duct, cast right in the floor of the cellar, as indicated in Fig. 1. The main reason for using this construction was that, while it is well known that such a duct should have a cross-sectional area equal to the combined areas of all the hot-air pipes leading to the rooms, the lack of room in the ordinary cellar often makes the installation of a duct of such size impossible. The duct cast in the floor overcame this objection. The floor and walls of the duct were cast in concrete. For the top of the duct slabs of reinforced concrete were cast in open forms, about 3 in. thick, 3 ft. long and 2 ft. wide, with beveled edges. After the slabs were seasoned

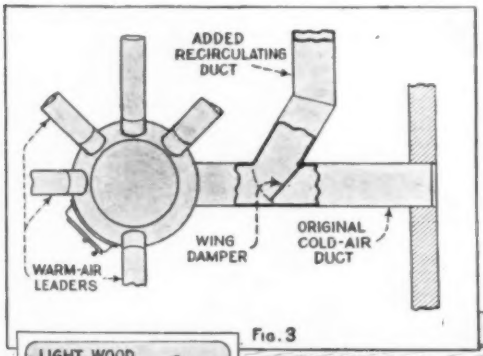


Fig. 3

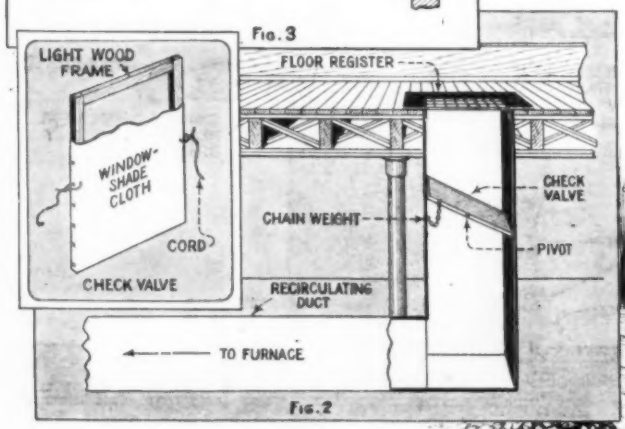


Fig. 2

Details of the Fitting of the Recirculation Duct, Floor Register and How the Check Valve or Damper Is Made and Installed

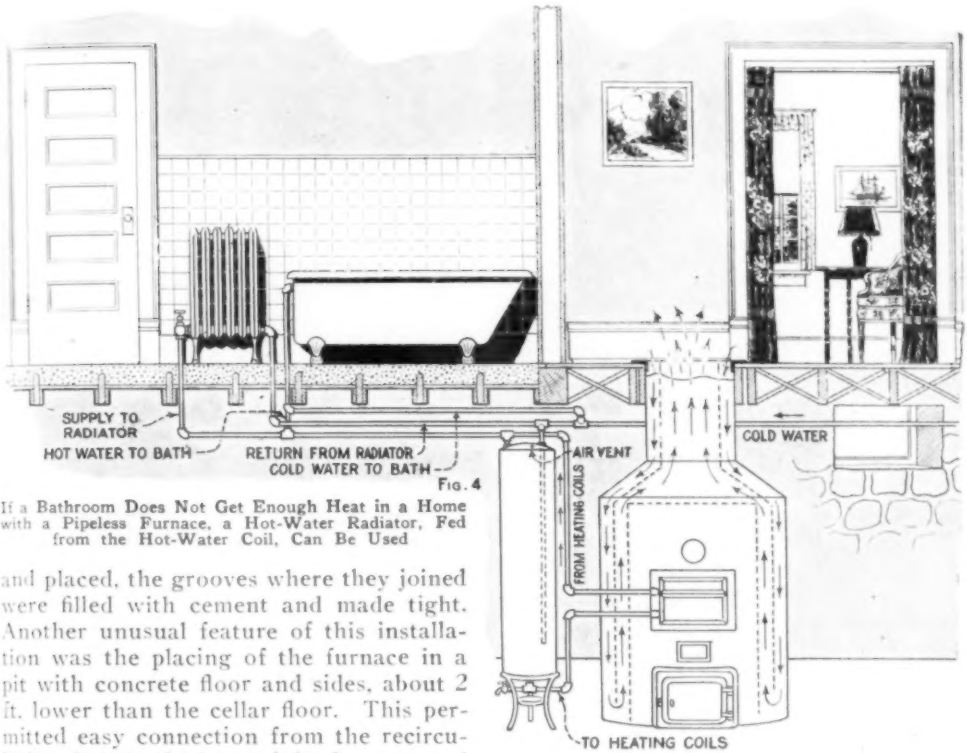


Fig. 4

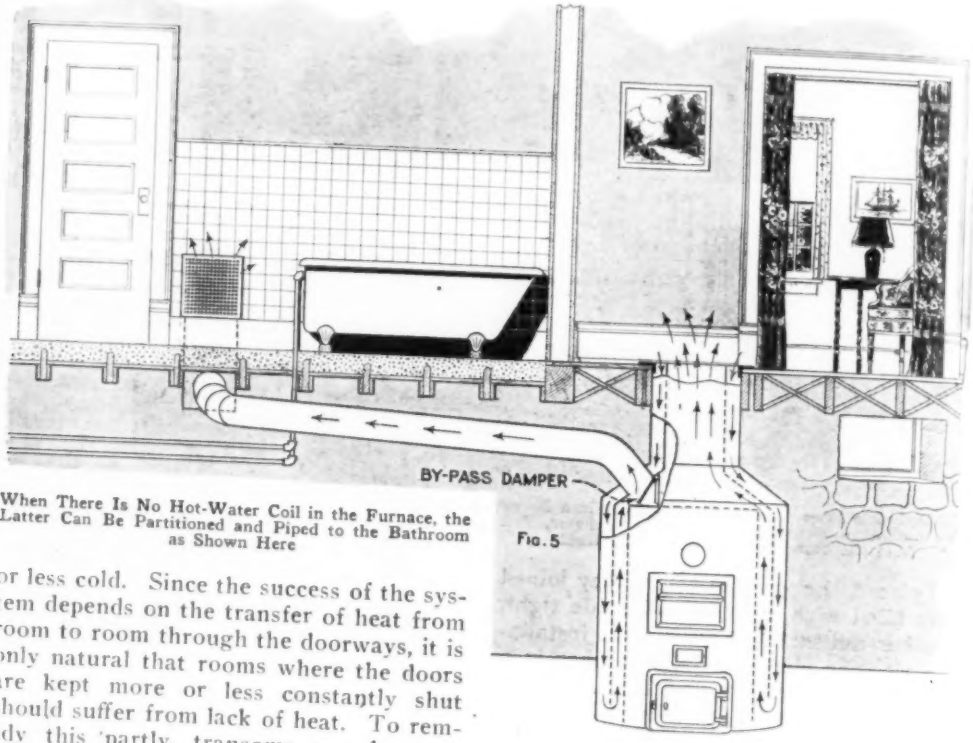
If a Bathroom Does Not Get Enough Heat in a Home with a Pipeless Furnace, a Hot-Water Radiator, Fed from the Hot-Water Coil, Can Be Used

and placed, the grooves where they joined were filled with cement and made tight. Another unusual feature of this installation was the placing of the furnace in a pit with concrete floor and sides, about 2 ft. lower than the cellar floor. This permitted easy connection from the recirculation duct to the base of the furnace, and saved labor in feeding coal to the furnace, while the extra height helped the draft in the hot-air flues, especially those leading to the first floor.

Where the floor duct cannot be installed, it is necessary to use a sheet-metal duct, proportioning this as mentioned above, or, if this is impossible, then as large as possible, at least as large as the original cold-air duct. The recirculation duct should be joined to the cold-air duct as illustrated in Fig. 3, so that a wing damper can be fitted to enable the air supply to the furnace to be taken either from outside or inside the house, or mixed in whatever proportions may be desirable, depending on the weather.

Occasionally, with a strong wind blowing into the outside cold-air duct of the installation described, more air would enter the duct than the furnace could handle. With the wing damper set, as it usually was, to take part of the supply from the inside and part from the outside, a strong current of cold air would flow around the damper and into the house through the recirculation duct and the register in the hall. This could be stopped, of course, by closing one of the ducts by means of the wing damper, but this was often undesirable. What was needed, therefore, was a very light, almost frictionless check valve in the recirculation duct; one that would offer no resistance to the downward flow of the air from the house, but that would close against any air coming back through the duct from the outside. The valve that was finally fitted is shown in Fig. 2. This was hung in the vertical duct from the first floor in an inclined position, and was supported on cord trunnions near its center of gravity, so that it would swing closed by its own weight, but would open under the slightest suction from the furnace. In order to balance the damper accurately a very light chain was hung in a loop with one end attached to the side of the flue, and the other to the side of the damper. By altering the length of the loop, it was easy to adjust the damper, which worked perfectly.

Where a one-register or pipeless furnace is used to heat the house it is often the case that the bathroom is always more



When There Is No Hot-Water Coil in the Furnace, the Latter Can Be Partitioned and Piped to the Bathroom as Shown Here

Fig. 5

or less cold. Since the success of the system depends on the transfer of heat from room to room through the doorways, it is only natural that rooms where the doors are kept more or less constantly shut should suffer from lack of heat. To remedy this partly, transoms can be provided over the doors, and these should be kept open. An opening should also be made at the bottom of the door. Another plan is to install a hot-water radiator connected to the range boiler, as shown in Fig. 4; if there is sufficient space, and there is no objection to the appearance, the range boiler may be located in the bathroom and connected to a water coil in the furnace. Still another plan is shown in Fig. 5, in which a partition is fitted to the furnace, and a part of the hot air led to a register in the bathroom by a regular leader pipe. There should be a damper in the leader pipe, so that all the heat can be sent to the rest of the house when heat is not needed for the bathroom.

An automatic thermostat (Fig. 6), for controlling the furnace drafts, will not only prove of great convenience, but will be found a fuel saver. These devices consist of a thermostat in one of the living rooms, which controls a clockwork motor mounted near the furnace, and this motor, in turn, controls the ash-pit and check drafts. When adjusted and set, the thermostat will open and close the drafts all day to main-

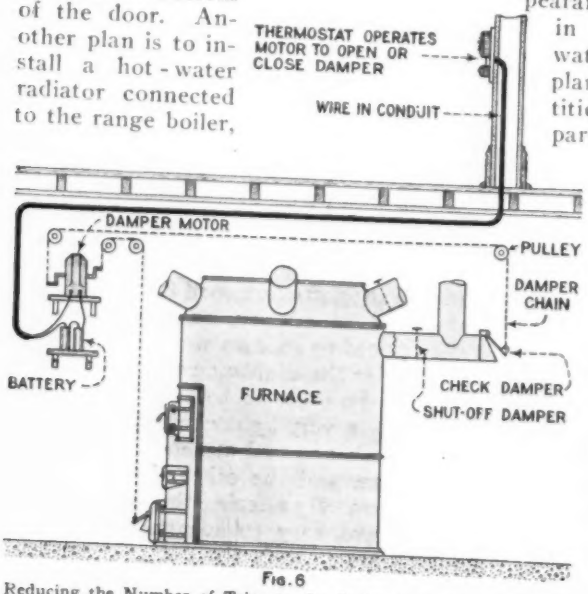


Fig. 6

Reducing the Number of Trips to the Cellar in a Day, and Keeping the Temperature at a Constant Figure, a Thermostat Installation Is Well Worth While

tain a certain temperature, and many models can be set so as to keep the house at a lower temperature during the night, and to open the drafts to raise the temperature in the morning. These devices save fuel and frequent trips to the furnace and they also serve to keep the temperature in the house much more uniform than can be done with the infrequent manual attention usually given the fire.

However, in cases where certain kinds of soft coal are burned in the furnace, the use of a thermostat of this type is impractical, since the fire must be broken up at regular intervals, due to the caking and swelling of the coal, and, if the fire must be attended to in this manner, the dampers can be adjusted at the same time, but with the majority of coals and coke, the use of the thermostat will be attended with greater fuel efficiency and increased comfort in the house.

A Portable Hog Corral

The problem of transporting hogs from field to field by means of a portable corral was solved by two farmers as shown in the illustration. The inclosure is made of 1 by 6-in. boards and is triangular in shape, with one side hinged so that it can be used as a gate. Three wheels, two on one side and one at the apex, allow just sufficient clearance for the corral to be readily pushed over the ground. Since using this method, hogs have been easily

Portable Pen in Which Hogs Are Transported from Place to Place

moved over a plank bridge from which, with ordinary driving methods, the animals were frequently frightened into the creek and drowned.—Mel Wharton, Portland, Oreg.

By Actual Test This Sawing Outfit Has Been Found to Do the Work of Two Men

One-Man Saw Outfit

This one-man saw outfit was made in two hours at a cost of 50 cents for material. The entire frame, including the pendulum, is made of 2 by 4-in. material. The pendulum works in a slide to prevent vibration and is adjustable in length for various sizes of timber by means of the holes bored in the upper end. This saw rig, by actual test, did the work of two men with a crosscut saw. It folds up like a pocketknife and is easily moved from log to log by one man. Also, it is adjustable to uneven ground.—E. Ellsworth Claspby, Lewiston, Pa.

Fill Tractor Tank with Kerosene to Prevent Rusting

When our tractor is placed in the shed for the winter, or at other times when it is not in use for several weeks, we fill the fuel tank with kerosene. Formerly this was not done and we often had trouble with rust getting into the pipe line to the carburetor. The rust forms on the inside of the tank, drops to the bottom and, as soon as the tank is filled, it washes along into the carburetor line.—Wendell N. Mitchell, Rogers, Nebr.

Ferrotyping Prints

When ferrotyping prints it will be found that a large percentage of the surplus water can be absorbed by a large piece of

Large Piece of Oilcloth Absorbs Surplus Moisture from Ferrotyped Prints

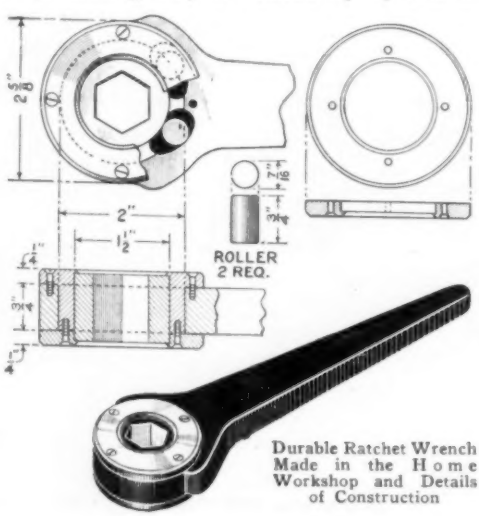
oilcloth and the prints will then dry much more quickly. Such a piece of oilcloth is much handier to use than blotters and costs less.—Auguste Mathieu, Chicago, Ill.

Motorcycle Engine Makes Good Air Compressor

A discarded single-cylinder motorcycle engine can be readily converted into an efficient air compressor by making only a few changes in the operating mechanism. In most cases it will be found that the compression, though rather high, is not sufficient to inflate a large storage tank to 150 lb. or more, but this difficulty is easily overcome. Take the motor apart and get a plate of brass, or other similar metal, about ¼ in. thick. Cut a disk out of this a few thousandths of an inch smaller in diameter than the diameter of the cylinder and fasten it to the piston head with machine screws that have their flat heads countersunk below the surface. This should raise the compression to the proper point, but if it does not, thicker metal must be used depending on the amount of space left between the top of the piston and the cylinder head. Remove the pushrod that operates the exhaust valve and discard it. Also remove the spring and the operating mechanism of the intake valve. Grind both valves carefully and replace the intake spring with a lighter and weaker one, which will open automatically on the suction stroke of the piston. New piston rings should be installed if necessary. Then reassemble the motor, connect the air line to the spark-plug hole and insert a check valve somewhere in the line near the compressor. Mount the engine conveniently to the power supply and, if the compressor originally was one of the belt-driven machines, the original pulley will still serve its purpose. If the engine was equipped with a sprocket, this should be removed and a flat pulley substituted. Plenty of good oil should be provided in the crankcase at all times to give lubrication, and a glass oil cup may be installed on the side to show the height of the oil.

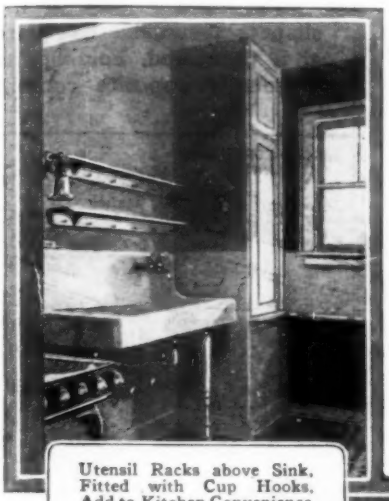
Homemade Ratchet Wrench

A handy set of ratchet wrenches can be made up by the home mechanic. Good steel, which is capable of being oil-tempered, should be used for this purpose. The sockets are hardened, but the handle is left normal. The rollers, which take the place of the usual ratchet and pawl, are also hardened. In use, a very slight back movement will release the rollers, yet they grip firmly. —Arthman N. Capron, Athelstan, P. Q. Canada.

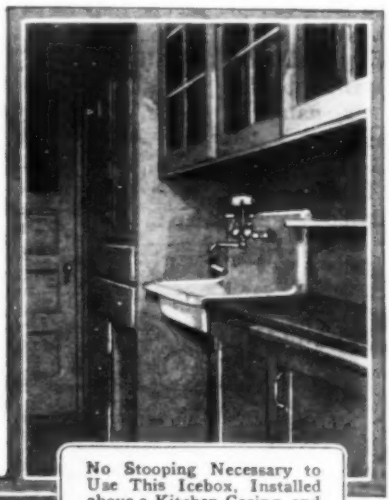


Durable Ratchet Wrench Made in the Home Workshop and Details of Construction

HINTS FOR BUILDER AND HOME OWNER

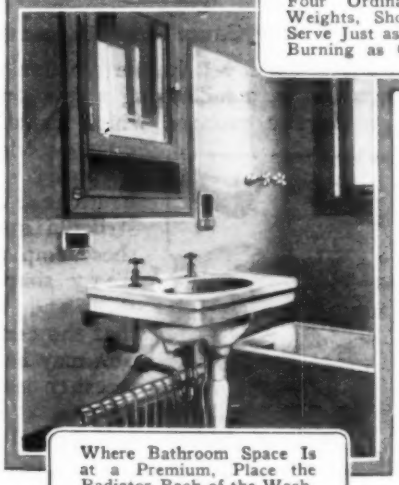


Utensil Racks above Sink, Fitted with Cup Hooks, Add to Kitchen Convenience and Please the Housewife

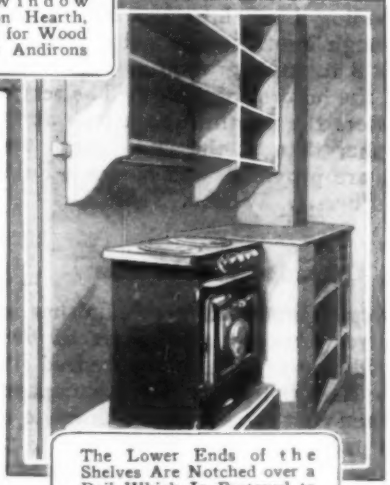


No Stooping Necessary to Use This Icebox, Installed above a Kitchen Casing, and Draining into the Sink

Four Ordinary Window Weights, Shown on Hearth, Serve Just as Well for Wood Burning as Costly Andirons



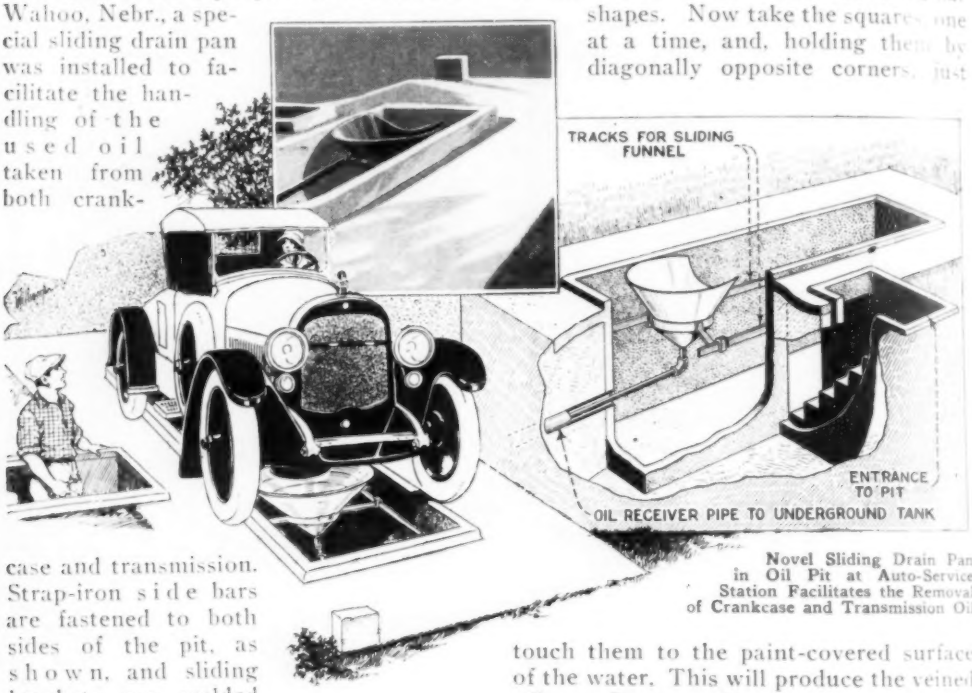
Where Bathroom Space Is at a Premium, Place the Radiator Back of the Wash-bowl as Shown



The Lower Ends of the Shelves Are Notched over a Rail Which Is Fastened to the Wall like Trim

Sliding Drain Pan for Service Station

In a new drain pit just constructed at Wahoo, Nebr., a special sliding drain pan was installed to facilitate the handling of the used oil taken from both crankcase and transmission. Strap-iron side bars are fastened to both sides of the pit, as shown, and sliding brackets are welded to an iron ring 26 in. in diameter, which holds a large funnel-shaped receiver. This can readily be moved directly under either the crankcase or the transmission drain. The funnel fits into the elbow of a 2-in. pipe leading back into the end of the pit through another pipe, which in turn extends 8 ft. underground to a receiving tank at the bottom of the pit. The service man enters the pit through a trap at the side rather than at the end. Both trap and pit are provided with covers.—Ralph W. McPherson, Wahoo, Nebr.



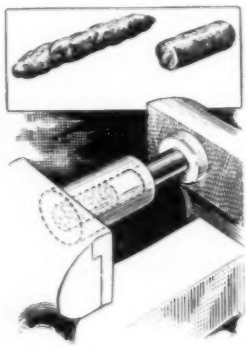
Novel Sliding Drain Pan in Oil Pit at Auto-Service Station Facilitates the Removal of Crankcase and Transmission Oil

Imitation Marble Tiles

To prepare imitation marble finishes for decorative purposes, cut pieces of fiber wallboard into squares of the desired size and round off the edges with a sandpaper block, then coat the squares with white or colored paint and allow them to dry. A pan large enough to hold the squares is partly filled with water. On the surface of the water drop some ordinary but rather thin-mixed oil paint the color of the veining. It will be found that the paint will distribute itself over the surface of the water in all sorts of irregular shapes. Now take the squares one at a time, and, holding them by diagonally opposite corners, just touch them to the paint-covered surface of the water. This will produce the veined effect. Remove the squares, turn them face up and allow them to dry. There is nothing to prevent a second treatment to produce veins of two or more different colors.—J. S. Hagans, Chicago, Ill.

Making Gauze Motor Brushes

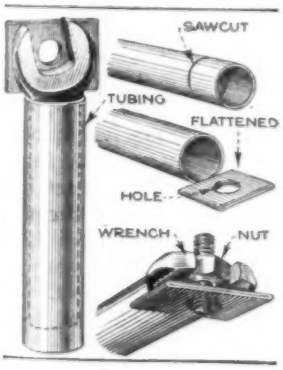
Being employed in the mechanical department of a mill using a few low-voltage electric motors, which usually are equipped with copper-gauze brushes, I constructed some of these, employing a very simple device, and believe that the construction may be of interest to many. A piece of cold-rolled steel shafting of suitable diameter was obtained for the forming die. This was cut about three times the length of the brush



and its ends squared. A hole of the same cross section and size as the brush was drilled entirely through this shafting. A punch was turned to make a sliding fit in this hole, its length from the shoulder to the end being made equal to that of the die minus the length of the brush. The material for the brush was flexible lamp-cord of suitable size, from which the insulation was removed. The wire was wadded up so that it could readily be forced into the die. The wad was placed in the die, the punch started, and the whole placed between the jaws of a vise and screwed up until the shoulder of the punch rested against the end of the die. The finished brush is pushed out of the die by means of a suitable drift. It is well to keep both the die and the punch well lubricated.—W. J. Edmonds, Whitehall, New York.

Wrench Attachment for Catching Nuts

A simple device for preventing the loss of nuts when dismantling or assembling machinery is shown in the illustration. It is, of course, always undesirable to drop small pieces like these into other parts of the machine where they can hardly be extricated and may cause trouble if left. Such trouble can be prevented by the use of the wrench attachment shown in the illustration. It is made from a short length of brass tubing, first sawed nearly through at one end and flattened out; then a hole is drilled through the flat part. This hole clears the end of the bolt if it happens to project through the nut. No particular care is required when using this attachment, as the nut drops on the flattened end when released from the bolt.



Graphite and oil will arrest cutting in bronze bearings when oil alone will not.

Wooden Pump Handle and Bracket Found Satisfactory in Emergency

Emergency Repair for Pump Handle

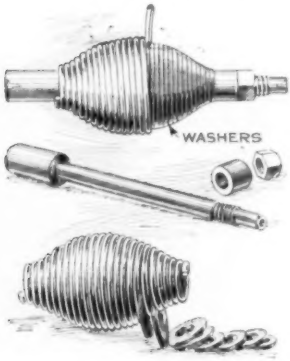
When the bracket on which the pump handle was pivoted broke off, the emergency repair shown in the illustration was adopted and found entirely satisfactory. Two pieces of 1 by 4-in. boards served as a standard, on the end of which a wooden handle was pivoted. This support was braced at the bottom and fastened securely to the wooden platform of the pump. The emergency handle thus made was found just as useful and convenient as the original.—L. M. Jordan, Vredenburgh, Alabama.

Handy Basting-Thread Pick

Tailors and seamstresses will find the alteration on a thimble shown in the illustration very handy for removing basting threads. An angular cut is made through the end of a common thimble and the piece is bent outward. With the thimble worn on the middle finger, the projecting point can readily be inserted under the stitches to be removed.—G. E. Hendrickson, Argyle, Wis.

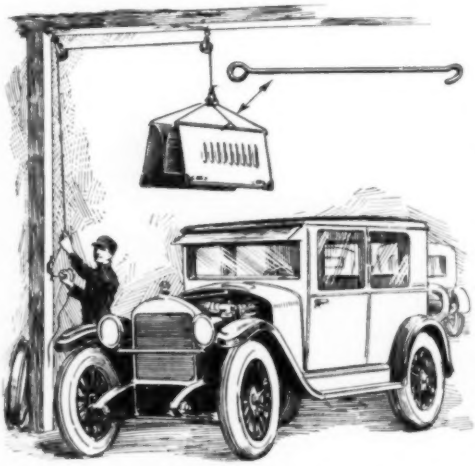
Spring-Winding Arbor

To wind an odd-shaped spring, such as shown in the illustration, is not difficult, but how to get it off the arbor is perplexing. We had a large number of these springs to wind and the work was done in the following way: The arbor was turned down a little, as shown, in the center and 1/16-in. washers were slipped on and held by a nut. The assembly was then put in a lathe and the washers turned down to the shape desired for the coil. After a spring had been wound, the arbor was removed from the lathe and the nut unscrewed. It was then an easy matter to slip the washers out of the spring as indicated in the lower detail. For convenience in reassembling, the washers should be numbered.—Charles Kugler, Philadelphia, Pa.



Lift for Handling Auto Hood

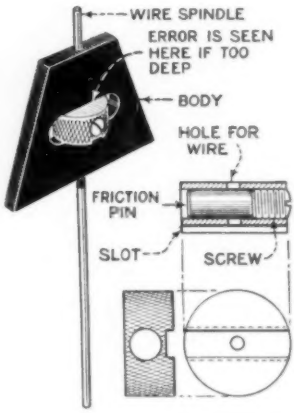
Handling the hood of an auto while working on the engine is something of a problem to many auto mechanics since it is easily marred and, if large, difficult to handle for one man, without damaging either the hood or the fenders. Four pieces of heavy wire or light round stock, shaped as shown in the detail and each measuring about 36 in. from eye to hook, form a sling and are strung together with a strong rope, which runs over a pulley as indicated. In use, the hooks are slipped under the edges of the cover and it is then pulled up and out of the way, the rope being fastened securely.—G. C. Douglas, Raleigh, N. C.



Lifting Auto Hood Entirely Out of the Way to Prevent Marring It

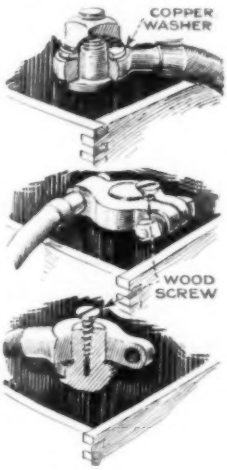
Sensitive Depth Gauge

All regular-type depth gauges have one fault; it is impossible to tell if the depth being measured is more than the setting of the gauge. This does not apply, of course, in the case of parts where the depth can be seen, nor is it a disadvantage where only one part is being measured, but when a depth gauge is used for inspecting a number of pieces, it is set to the correct depth and, if the work is too shallow, the body of the gauge will stand clear of the work. If the body of the gauge touches the work, however, there is no means of telling how deep the part is without altering the setting of the spindle. The sensitive gauge shown is particularly adapted for inspection work, because it not only measures the depth to which it is set, but also shows if the part is deeper, and how much. The body is made of 3/16-in. flat stock and the wire spindle is 3/32 in. thick. A slot is cut in the center of the body to receive a special tightening collar, which is a knurled round piece, drilled in the center for the wire spindle, through the side for a friction pin, and is also drilled and tapped for a set-



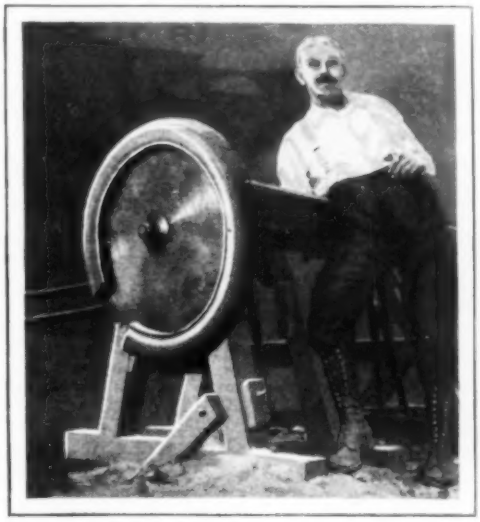
screw. The friction pin is drilled to receive the wire spindle also. The bottom of the tightening collar is slotted, to clear the width of the body about 3/16 in. When setting the gauge to depth, the collar is turned with the slot at right angles to the body, but, in use, the slot is turned back in line. The body of the gauge will stand clear of the top surface of the work in the ordinary way if the depth is too shallow, but if the hole is too deep, the spindle will drop down and show the extent of the error between the top of the tightening collar and the slot. If the hole is correct, there is no play in the spindle and the body of the gauge rests on the work.—Harry Moore, Montreal, Can.

Tightening Storage-Battery Terminals



Storage - battery terminals must be kept tight to prevent them from loosening due to constant vibration. When the nut cannot be screwed down any more because of the shoulder on the terminal one or more copper washers under the nut will often remedy the trouble. Another method of tightening the lug on the terminal is to drive down a small wood screw into the terminal or between the lug and the terminal, as shown in the two lower figures of the illustration. This acts as a wedge and spreads the terminal, taking up all the play between the lug and terminal. Even a nail will serve if a screw should happen not to be at hand.—G. A. Luers, Washington, D. C.

April is the best month of the year in which to hatch Leghorns and other light breeds of poultry.



Old Auto Casings Slipped over Large Circular Saws Offer Protection

Casing Protects Circular Saw

Old automobile casings will be found useful around woodworking plants, mills and in farm shops having large circular saws. Cut the casing as shown in the photo so that it can be slipped over the saw easily. This not only protects the saw but also prevents anyone from getting hurt while the saw is not in use.—J. B. Tate, Mokelumne Hill, Calif.

Handy Graduation for Calipers

Calipers will be found much handier if graduated as illustrated. The points are first set to the desired dimensions and lines are scratched on one side with the scribers. The other arm should be beveled. The dimensions should be stamped or deeply etched so as not to become unreadable.—C. D. Zellar, Chicago, Ill.

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Is This Your Home?

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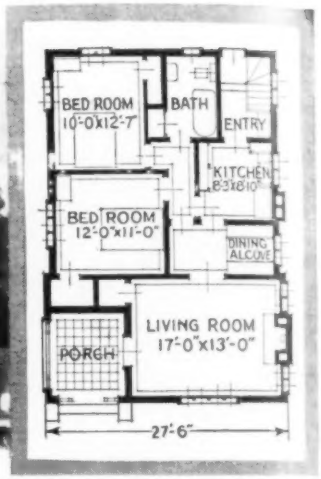

Plan No. 4B14

QUESTIONS regarding home building addressed to this magazine will be answered by The Architects' Small House Service Bureau of the United States, Inc., controlled by the American Institute of Architects and endorsed by the United States department of commerce. Inclose 10c and self-addressed envelope. Blueprints, specifications and material list for the house shown here may be obtained at nominal cost. Inclose self-addressed stamped envelope for reply. If further information is desired, send 5c and stamped envelope for a 24-page booklet explaining how the Small House Service Bureau functions and showing 12 sample plans. A new booklet, entitled "Fifty Ways to Lower Home Building Costs," illustrated by ten bureau houses actually lived in, and showing how as much as $1,000 can be saved on a home, may be obtained for 20 cents.

THIS four-room bungalow is an unusually fine example of the home that is all on one floor. Although of a conservative style, it has many individual features.

The porch may be inclosed as an extra room, or left open with trellises for trimming. In either case, it is within the main body of the house, and gives protection to the entrance door.

The working drawings for this design provide two methods of locating the partitions. One allows for a dining alcove and the other for a dining room approximately nine by twelve feet. There are many people who consider a formal dining room essential, and this alternate arrangement was worked out so that anyone who wanted a larger dining space than the dining alcove provided in the original plan, could build from this design. The one set of plans provides for both these arrangements, however.

The rooms open into each other in a convenient manner. The living room, approximately seventeen by thirteen feet, has windows on two sides and a handsome fireplace at one end. A closet opens from the living room. In the alternate plan the living room and dining room are almost one large room, because of the wide opening between them.

The kitchen is arranged for the greatest efficiency, with plenty of cupboard room and everything within easy reach.

The two bedrooms and bath open from a small hall. Each bedroom has a large clothes closet, and there is a linen closet in the bathroom.

Home Builders' Questions

Q. How much extra will it cost to add a fireplace to our house while building? Can much be saved by building an inside fireplace instead of an outside one? A. The extra cost for a fireplace ranges between $250 and $400, depending on how many flues it contains, its size, height, the design of the mantel, and so on. An inside fireplace saves the difference in cost between face brick and common brick for that part of the stack which is within the house above grade.

Q. What is the ideal exposure for the different rooms of an ordinary house? A. The living room and living porch should be to the south or southwest, the dining room should have an eastern exposure for morning light, the principal bedrooms should have advantage of the best summer breeze. The best outlook from the living rooms should be given much consideration in arranging the rooms and facing the house.

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Vol. 46

Contents for December, 1926

No. 6

Accidents
annual loss from accidents in U. S. 937
deaths in air accidents the past year 896
Advertising
pattern of lighted windows for holiday display 928
street-car straps carry ads 998
twenty-four-foot rooster advertises farm 993
Air
from well harnessed to aid diggers 938
thirty miles up hotter than boiling water? 930
Airplane—built like seagull 942
Archæology
dig up city where Abraham offered sacrifice 950
seek fabled "City of Brass" in Sahara 965
Architecture—library roof in tile mosaic 954
Art—Roman art copied in arch for American troops 989
Astronomy—day lengthened as moon recedes from earth 962
Automobile
small racing to run on Norwegian railroads 893
three-wheel auto first in six-day race 931
Automobiles—Driving
barriers and hairpin bench add thrills to race 962
new motorist more careful than experienced one 968
safety signals urged for drivers 954
Automobiles—Equipment and Supplies
auto awning keeps out sun and diverts rain 917
cylinder-head lifter fits spark plug holes 940
emergency brake horn switch 908
gauge for motor cylinders 978
lost auto license rack aids motorists 914
mud grips fit on auto tires 945
rear-wheel runs pump 951
sidewalk periscope on auto 939
sliding front seat for auto 937
winker for stop lights 960
Automobiles—Fuel—grain dust used as 951
Automobiles—Lubrication—oiler with signal light 894
Automobiles—Tires
chemicals raise mileage 975
spare of wood blocks costs less than rubber 962
Automobiles—Wheels—two-piece rim on auto wheel 931
Aviation—concrete ears are airplane defense 955
Belt—guards street worker against motor accident 994
Birds
nest sought for centuries found in Alaska 961
wonderful traits of 906
Blind—lighted armband for gives night protection 969
Boats and Boating—oars preferred to motor on royal craft 883
Bridge—of old rope and bamboo in Japan 906
Buddha—figure of disclosed in cave-in 945
Building
quake-proof 940
sawed in two to dry moisture 984
Camera—as large as auto used as ad 910
Christmas Trees—where they get their names 952
Circus—when white tops are laid away 898
Cotton—auto picker protects plants 967
Crime—new war on 918
Diving—helmet for shallow diving 986
Door—knocker rings bell and lights lamp 913
Drawing—machine draws billion of curves 999
Electric Fan—painter wears at work 927
Electric Lamp—held in mouth 914
Electricity
generator could light a million homes 958
man-made lightning bolt 881
Fence—cone-shaped bases for posts 989
Field Glasses—as spectacles 977
Fire—half of deaths from occur in homes 914
Fire Engine—with water tank 984
Fishing—hook holder on rod 929
Flowers
Chinese use roses for flavoring 939
fashioned in iron 959
Fog—coal strike in England helped clear air 951
Furnace—electric man fires and removes ashes 952
Gauge—metal rule for fitting corks 883
Golf—balls collide on drive 928
Gun
bullet cleans rifle barrel 910
flintlock fired in honor of Daniel Boone 885
Hammer
has steel "backbone" to keep head on 992
pulls nails without bending 968
Hanger—garment, folds up 992
Heater
hot water for auto 993
that burns gasoline, serves as fireplace 965
Horse
six horses defeat elephant in pulling contest 987
too small to wear shoes 938
Household Devices 990
House Plan 1056
Hurricane—terrors from the tropics 888
Ice—auto motor runs cutter 944
Ice Cream
from crude oil 960
sandwich carrier 1000
Ice Storms—costly beauty of 995
Jewelry—when people marry shown by survey of 992
Kite—eighty-five-foot dragon kite has blinking eyes 908
Light—shadow effects show way to place lights 985
Lighthouse—cottage built as affords wide view 967
Lightning
most dangerous freak 953
strikes road 929
Lizards—gigantic in Malay 952
Loading and Unloading—tractor outfit saves hand shoveling 964
Lock—without key opens at touch 968
Locomotive
noise ended with gun silencer 974
run by turbine 894
Mail Box—twelve foot 937
Memorial—stone arch honors war heroes 916
Microphone—for home detects thieves 976
Models
of opera scenes 977
woman carves ship 906
Money
Chinese coin to burn for offerings for dead 917
queer things used as money centuries ago 941
Mosquitoes—airplane war on 983
Motion Picture Camera—rod supports as substitute for tripod 962
Motorboat—super-speed boat 955
Mountain—seen through frame resembles painting 893
Mountain Climbing
cable road to Alpine peak 924
in your car 932
Muff—and handbag combined 927
Numbers—magic lure of 979
Parachutes—to land mail on non-stop flights 993
Pencil—telescope, as ruler 955

[Continued on Page 4]

[Contents—Continued]

Phonograph
and radio combined 1004
with electric arm 954
Photography
exposure meter for photos 895
taken through eye of glow worm 969
Puller—flexible, for packing 938
Race—through wire barriers 887
Radiators—hidden in walls 897
Radio
lessons by radio to pupils of five states 895
news from far and near 1009
operates fog signal 998
replaces fog gun 925
shifting of northern lights blocks radio reception 1000
test of auto shows polish flaws 887
voice puts out flame twelve miles away 929
Radio Battery—wall socket for radio batteries 1008
Radio Construction
fused battery cable protects tubes 1014
some radio troubles 1008
Radio Jacks—tips on 1011
Radio Loud Speaker
loud speaker on police auto 988
shaped like book 1004
Radio Receivers
one-control neutrodyne works on loop 1003
three-tube set works on loop 1005
using resistance-coupled amplifier in 1927 model superhet 1010
Radio Tube—how to build a portable tube booster 1001
Radium—lost fortunes in, found with amber rod 913
Railroad
golden spike driven to mark rail anniversary 931
tank car as filling station serves railroad 989
water bottles heat cars of Italian railroad 943
Rink—and ballroom combined 911
Road—sands of American Sahara bridged by concrete 915
Rope—tied in sailors' knots woven in basket 928
Rust—polished cover on steel nut keeps out 887
Sander
jointer and edger combined 916
portable for boats 992
wheelbarrow dusts slippery walks 969
Saws—saw attachment for tractors 925
Shark—rare angel, caught off California 910
Ships
ice bound Baltic sea grips fifteen steamers 984
steel cage for lifting substitute for locks 978
Shoe Polish—in stick form 952
Shoes
for mountain climbers 896
three pairs in one 960
Ski—races behind motorcycle 897
Sleeping Bag—warmly lined carried in shawl strap 965
Snowplow—on motor truck throws to both sides 911
Sports—Skiing—shooting through the air on wooden wings 970
Steel—cutting flame run by electric motor 886
Stopper—makes siphon bottle 988
Street Traffic Regulations
mirror guides at crossing help prevent accidents 975
two pivot turns for autos 986
Suitcase—mounted on wheels 917
Telescope
sixty-eight foot 1000
world's largest to bring stars nearer us 966
Thermos Bag—for ice cream cans 951
Tools
mechanical man tests life of railway shovels 968
seven in one 942
Toy
balloons aid diver in prolonging thrills 907
how toys are changing the world 946
stone playhouse built like castle 930
Truck
hand, carries oil drum upright 975
with "upstairs drive" 994
Typewriter
book holder on 958
holder rack on 945
Waffle—iron 960
Washington, D. C.—U. S. plans to complete capital 927
Watch
as cuff link protected by sleeve 962
test nineteen days to prove repairers' skill 894
Water Sports
new thrills found in water ball 944
race between water cycles 939
shoes for walking on water 930
Windmill
old, tower remade into skyscraper bungalow 896
vertical blades on to generate power 964
Woman Champions 956
Wrench
giant, built for crane 999
with spring on jaw 998

AMATEUR MECHANICS

Acetylene—bicycle lamp makes hot flame 1017
Automobiles—Lighting—indirect illumination on dash 1017
Automobiles—Repairing
how to stop body vibration 1031
safety blocks hold auto wheels 1036
Canoes—refinishing old canvas 1036
Clip
keeps notebook in vest pocket 1031
paper fastener makes pencil clip 1017
Clothesline—box on pole stores 1024
Cushion—shock absorbing seat 1019
Door—safety catch for door hook 1031
Drawing—continuous supply of paper for drawing table 1018
Fountain—provides water for dogs 1035
Furniture—colonial bric-a-brac for the amateur 1020
Glue—emergency pot 1017
Iceboat—shock absorbing runners 1035
Ladder—repaired with wire 1032
Model—build your own ship model 1025
Ornament and Decoration—for Christmas tree 1019
Painting
floors painted in two colors 1032
priming wood 1018
Periodicals—cardboard carton files magazines 1033
Photography
marking films in dark room 1017
photographic prints flattened in roller shade 1018
Poultry—disinfecting 1032
Screwdriver—driving screw hooks in ceiling 1024
Seat—spring construction seat of racing auto 1035
Swing
combined swing and trapeze for children 1036
increasing capacity of 1019
Tent—repair for torn 1033
Toboggan Slide—build a winter 1015
Toy—busy blacksmith toy 1034
Troughs—concrete troughs cast upside down 1024

SHOP NOTES

Automobiles — Equipment and Supplies — keeping closed car warm 1043
Building Construction—hints for builder and home owner 1051
Calipers—handy graduation for 1055
Conveyor—counter for roller 1042
Crane—for small garage 1037
Electric Motor—making gauze motor brushes 1052
Emery Wheel—stand 1040
Flange—homemade tool for straightening steel 1039
Furnace—improving your hot air furnace 1045
Garage—sliding drain pan for service station 1052
Garage—Equipment and Supplies—lift for handling auto hood 1054
Gate—with hinges at top keeps stock safe 1043
Gauge
improved drill and wire gauge 1041
sensitive depth 1054
Holder—helps in grinding bearing caps 1044
Hydrant—installation for farms 1040
Mallet—for glaziers 1044
Mechanical Drawing—triangle fitted to be used as T-square 1043
Motorcycle—engine makes good air compressor 1050
Plumb—homemade bob 1042
Pump—emergency repair for handle 1053
Punch—for backing out rivets made from old hammer 1044
Railroad Rolling Stock — handling railway trucks easily 1039
Riveting Machine—support for dump doors makes riveting easy 1041
Saws and Sawing Rigs
casing protects circular saw 1055
one-man saw outfit 1049
Solder and Soldering—keeping kit handy 1041
Spring—winding arbor 1054
Storage Battery—tightening terminals 1055
Swine—portable hog corral 1049
Tailor—handy basting thread pick 1053
Tap—altered machine tap works better 1040
Tractor—fill tank with kerosene to prevent rusting 1049
Valve Cage—tool adjustable for height 1038
Wrench
attachment for catching nuts 1053
homemade ratchet 1050

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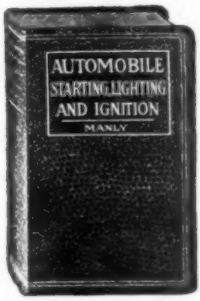

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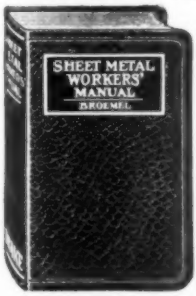

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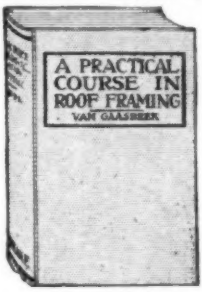

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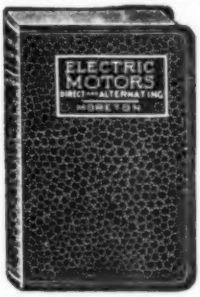

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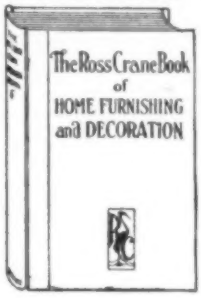

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H. L. Wood, a clerk, made more than $700 "on the side" before he had completed his course and also won $125 in prizes. Harry William Lord writes that he has more than doubled his salary as a result of studying this I. C. S. course in spare time. William Whitman, a former wagon builder, now has a sign painting business of his own and is earning *nearly three times* as much as he did before enrolling with the International Correspondence Schools.

There is no doubt that Show Card Lettering and Sign Lettering offer a real opportunity to ambitious men and women. Just mark and mail the coupon and we'll gladly send you a booklet telling all about the I. C. S. course in Show Card Lettering, or any other subject in which you are interested.

INTERNATIONAL CORRESPONDENCE SCHOOLS.
Box 5614-E, Scranton, Penna.

Without cost or obligation on my part, please tell me how I can qualify for the position or in the subject before which I have marked an X:

☐ **SHOW CARD LETTERING**

☐ **ILLUSTRATING**
☐ Business Management
☐ Industrial Management
☐ Personnel Organization
☐ Traffic Management
☐ Business Law
☐ Banking and Banking Law
☐ Accountancy (including C.P.A.)
☐ Nicholson Cost Accounting
☐ Bookkeeping
☐ Private Secretary

☐ **CARTOONING**
☐ Salesmanship
☐ Advertising
☐ Better Letters
☐ French ☐ Spanish
☐ Stenography and Typing
☐ Business English
☐ Civil Service
☐ Railway Mail Clerk
☐ Common School Subjects
☐ High School Subjects

TECHNICAL AND INDUSTRIAL COURSES

☐ Electrical Engineering
☐ Electric Lighting
☐ Mechanical Engineer
☐ Mechanical Draftsman
☐ Machine Shop Practice
☐ Railroad Positions
☐ Gas Engine Operating
☐ Civil Engineer
☐ Surveying and Mapping
☐ Metallurgy ☐ Mining
☐ Steam Engineering ☐ Radio

☐ Architect
☐ Architects' Blueprints
☐ Contractor and Builder
☐ Architectural Draftsman
☐ Concrete Builder
☐ Structural Engineer
☐ Chemistry ☐ Pharmacy
☐ Automobile Work
☐ Airplane Engines
☐ Agriculture and Poultry
☐ Mathematics

Name.....

Street Address.....

City..... State.....

The International Correspondence Schools are the oldest and largest correspondence schools in the world

Are You Hungry For... Adventure.. Popularity. Big Pay?

THEN CHOOSE AVIATION!

ARE you a red-blooded, daring he-man? Are you eager for a life of constant thrills, constant excitement and fascinating events? Do you crave adventure, popularity, admiration, and the applause of great crowds? Then why not get into the Aviation Industry—the greatest adventure since time began—the greatest thrill ever offered to man?

Think what Aviation offers you. Thrills such as you never had before! The praise and plaudits of the multitude. Ordinary salaries from $75 to better than $400 a week! And a chance to get in on the ground floor where rewards will be unlimited!

Aviation is growing so swiftly that one can hardly keep track of all the astonishing new developments. Air-mail routes have just been extended to form a vast aerial network over the entire U. S. Airlines and airplane factories are springing up all over the country. Men like Henry Ford are investing Millions in the future of commercial Aeronautics in America! The possibilities are so tremendous that they stagger imagination!

Everything is set for the greatest boom in history. The fortunes that came out of the automobile industry and out of motion pictures will be nothing compared to the fortunes that will come out of Aviation! There is just one thing holding it up:—lack of trained men! Even in the beginning thousands will be needed—and generously paid. The opportunities open to them cannot be overestimated. Those who qualify quickly will find themselves on the road to undreamed of money—success—popularity—and prominence!

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$60 to $150 per week
Aeronautical Engineer
$100 to $300 per week
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Enormous Profits
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Aeroplane Mechanician
$40 to $60 per week
Aeroplane Inspector
$50 to $75 per week
Aeroplane Salesman
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Aeroplane Assembler
$40 to $65 per week
Aeroplane Builder
$75 to $200 per week

Easy to Become An Aviation Expert

$50 to $100 a Week

Get into this thrilling profession at once while the field is new and uncrowded. Now—by a unique new plan—you can quickly secure the basic training for one of these wonderful high salaried jobs, at home, in spare time. Experts will teach you the secrets—give you all the inside facts that are essential to your success. And, the study of Aviation is almost as fascinating as the actual work itself. Every Lesson is chock-full of interest—and so absorbing that you actually forget you are studying. But best of all are the ultimate rewards you are fitting yourself to gain!

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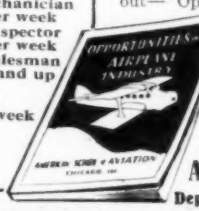
Send the coupon for our new, free book, just out—"Opportunities in the Airplane Industry." It is vitally interesting, reads like a romance and tells you things about this astonishing profession you never even dreamed of. This book is so fascinating it could easily sell for a dollar. We offer a limited number FREE. Write for yours today.



American School of Aviation
Dept. 1359, 3601 Michigan Ave., Chicago, Ill.

AMERICAN SCHOOL OF AVIATION,
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Without any obligation please send me FREE book "Opportunities in the Airplane Industry." Also information about your course in Practical Aeronautics.

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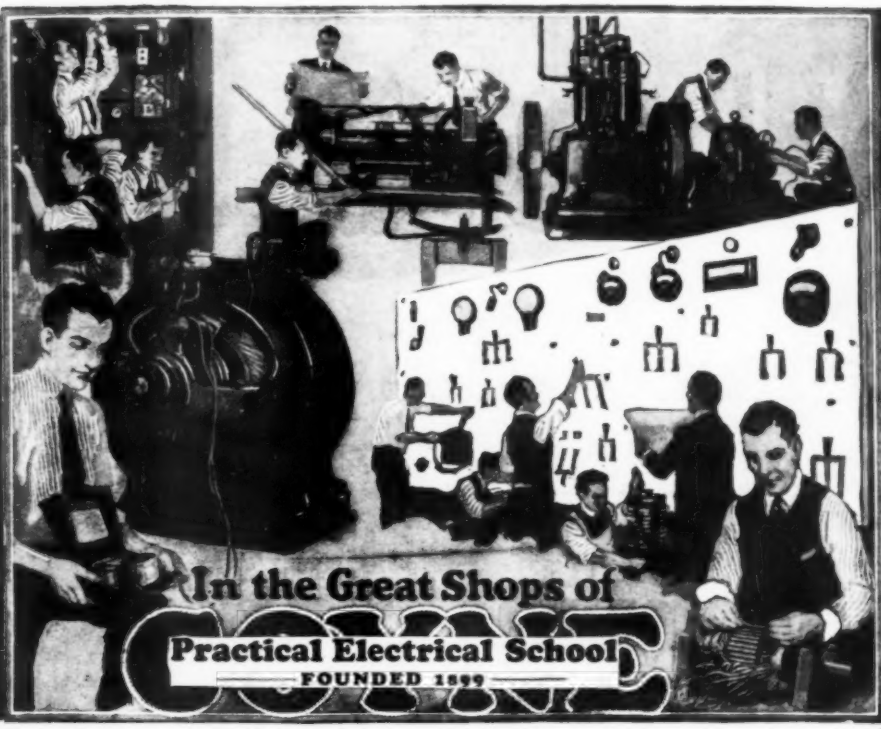

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For a short time I'll pay your Railroad Fare to Chicago, and besides I'll include Free my two big Courses, Auto and Radio Electricity.

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I haven't space here to tell you the advantages of my training but I'll send ABSOLUTELY FREE my big new book with over 150 actual photographs and success stories of my graduates. It tells you all about my employment service after graduation and how you can earn your expenses while attending my school. FILL OUT THE COUPON NOW AND MAIL IT AT ONCE. You owe it to yourself to get the facts.

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Dr. Harlan Tarbell
Master of Magic
who has mystified magicians as well as laymen with his marvelous magic.

Astonish Your Friends!

Gain the magnetic popularity that makes you the center of any crowd. Business and social success is assured the man who can perform mystifying tricks. You can earn big money on the side or as a professional, as well as being the most popular person in your crowd. Why envy others' skill? You can learn Magic yourself, quickly and easily.

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read *what the Great Madame Hermann says:*

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Earn $250 to $1000 a Month

even sleight of hand, generally supposed to require long practice, is NOW made simple to learn. For Dr. Harlan Tarbell, one of the really Great Magicians, has finally opened up the secrets of his profession in a completely illustrated course offered at a merely nominal cost. Through the wonderful Tarbell system you will be able to mystify and entertain your friends. After that Dr. Harlan Tarbell takes you through the entire maze of sleight of hand, card tricks and elaborate stage divertisements. The apparently superhuman doings of the accomplished magician becomes as simple as ABC.

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Gentlemen: Without any obligation send me your free literature and information all about your wonderful "Tarbell Course in Magic." Also tell me about your great Special Price Offer and Easy Payment Plan—offered NOW for limited time only.

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There is a tremendous demand for magic entertainment. Clubs, Lodges, Charity and Social affairs—all will pay high fees to the man who knows Magic. Dr. Harlan Tarbell really gets as high as $250 for a half hour's work right now. Opportunity everywhere to make money aside from your regular occupation. Salesmen find it a tremendous asset. Find out all about this unprecedented opportunity to learn Magic. Learn about the great Special Price and Easy Payment Offer we are making Now, for a limited time only. The coupon brings full details without any obligation. *Mail it TODAY.*

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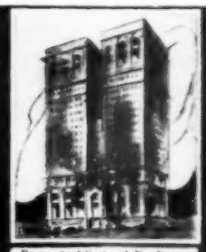
Be a Machine Draftsman—earn $60 to $150 a week

Be a Structural Draftsman—earn $60 to $200 a week



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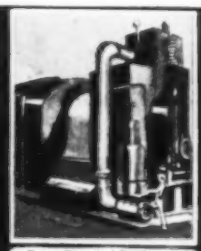

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3 Drafting Lessons Actually FREE!

to prove you can LEARN AT HOME, IN YOUR SPARE TIME!

We have invented a new, simplified way to teach Drafting—the first real improvement in Drafting home-instruction in history. We want you to see it, try it—without one penny of cost or obligation. We want to show you how we get away from the **copying** methods used in the past. See how we make you **think,** solve problems, do actual drafting room jobs **from the first lesson!**

Draftsman Wanted $60 to $125 a week!

70,000 fine jobs advertised this year. Get ready to fill one. Get out of the rut. Make something of yourself. Plan your future in Drafting. Even if you have only common schooling, even if you know nothing of Drafting, we guarantee to make you a real Draftsman **or to refund your money!** Special surprise offer right now to the first 500 men who answer this ad—reduced price, easy terms. Coupon brings complete information.

A New, Rapid, Easier Training

Copying drafting lessons prepares you to be only a "tracer." This new "Job-Method" gives you actual drafting-room jobs in a new one-step-at-a-time way. With **pictures** which you can understand almost without reading the "lessons." And that is why American School-trained Draftsmen can qualify for a good job at big pay when they graduate.

Win Success Through Drafting

Drafting is easy, fascinating work. Short hours. Big pay. And the Draftsman is always in line for promotion for executive positions. This training is **Complete.** It includes high-school subjects (if you need them) and all the Engineering and Mathematics required of Drafting Experts.

Coupon Brings Three Lessons Free!

Get them. Test your own ability to learn Drafting and get ready for a fine job and big pay. Coupon also brings surprise offer, and complete information about your opportunities for success in Drafting.

FREE Job Service

Our employment department will help place you in a good job. Demand exceeds the supply. No charge for nation-wide employment service. Read want-ads for Draftsmen every day in Chicago Tribune or any big city paper—see the opportunities for yourself—**and get ready for them.**

MAIL COUPON TODAY!

Complete Costly Drafting Outfit GIVEN!

You need a fine outfit like this to do precise, neat Drafting. Not one penny of extra charge for this complete, valuable, high grade outfit. Imported instruments. Table, board, mahogany-edge T square, triangles, ink, thumbtacks, etc., everything you will need. Retail value $20. Coupon brings this Free Offer.

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Rush 3 Free Drafting Lessons, Surprise offer, complete information, money-back guarantee, etc., to prove I can become a real draftsman at home in spare time.

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CHIEF DRAFTING ENGINEER
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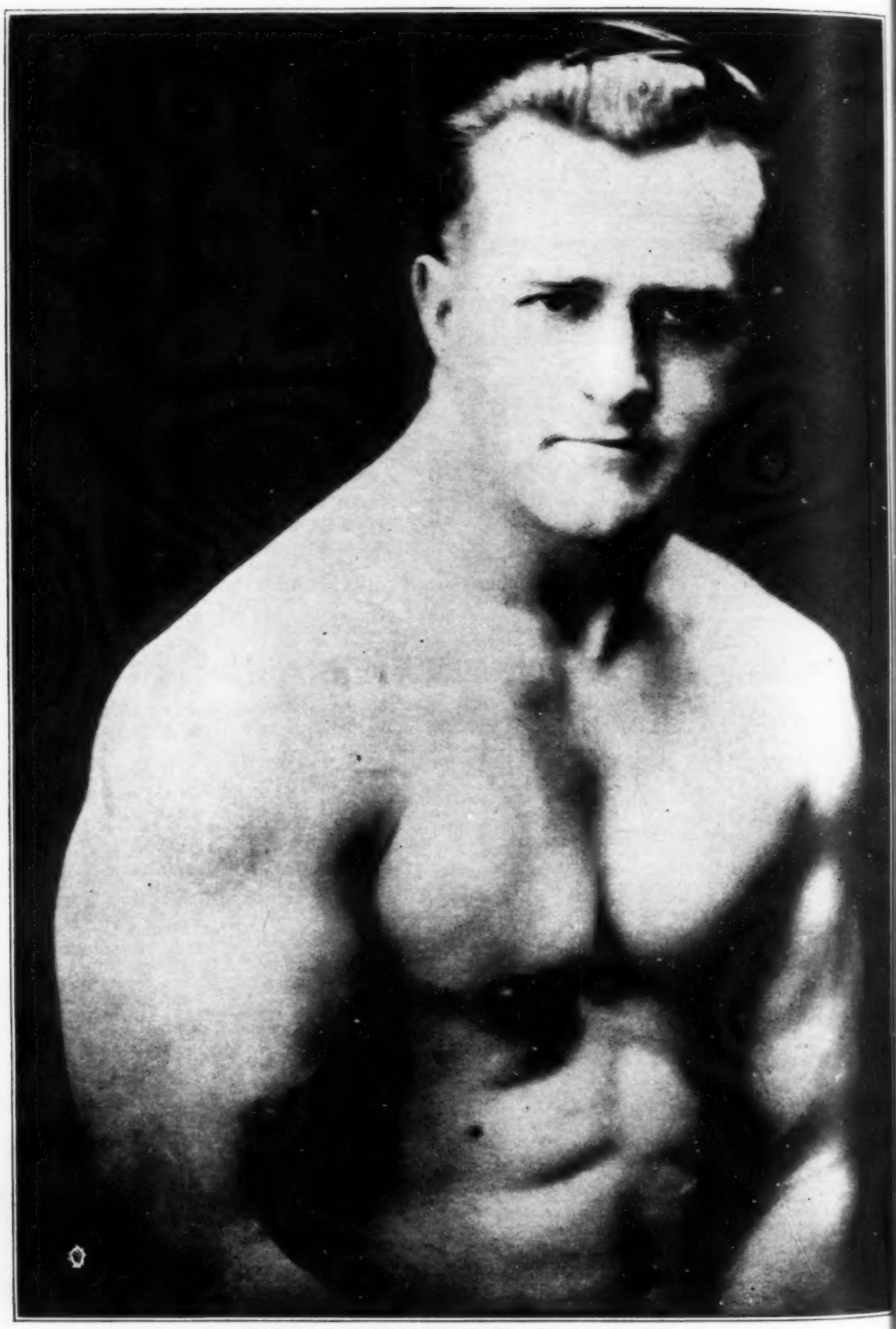


EARLE E. LIEDERMAN, *The Muscle Builder*

Author of "Science of Wrestling," "Muscle Building," "Secrets of Strength," "Here's Health," "Endurance," etc.

I Walked Over 3000 Miles

to Shake Hands With Earle E. Liederman! Read How I Who Was Doomed To Die Gained Health and Strength.

By Chas. Todd.

I didn't take this long hike from San Francisco to New York to win a bet—no, fellows, I took this long jaunt because I wanted to meet Earle E. Liederman face to face, shake him by the hand and let him see what a wonderful job he did for me. I wanted him to see the wonderful muscles he built for me—I wanted him to know of the endurance I attained from taking his course.

I was doomed to die—so the doctors said. Think of the agonized suffering which I went through. I was told that I would never be strong and healthy and that if I exerted myself I would quickly go to the great beyond. Think of it, fellows? Death was playing tag with me, dogging my very footsteps and the odds of me living a full, natural life were 1,000 to 1 against me—I fooled them all.

Earle E. Liederman Came to My Rescue

Mr. Liederman never heard of me, but I heard of his method of body building and determined I couldn't lose by writing him. As the situation was at that time, I didn't think Liederman could give me health any more than anyone else, but I decided in my desperation that I had nothing to lose and everything to gain and like a drowning man grasping at a last straw, I wrote and told him all my health troubles.

I Received the Greatest Surprise of My Life

Lickety split, by return mail, Mr. Liederman personally communicated with me and gave me my first ray of hope—he said he could help me! He also wrote that he would give me all the dope on getting healthy and strong by mail, just as he does every day for thousands of others. But, because my case was such an exceptional one, he would have to ask me to work closer with him than his ordinary run of students. I told him I was at his mercy and that his orders would be law and that I would follow his advice to the letter.

A Miracle In Thirty Days

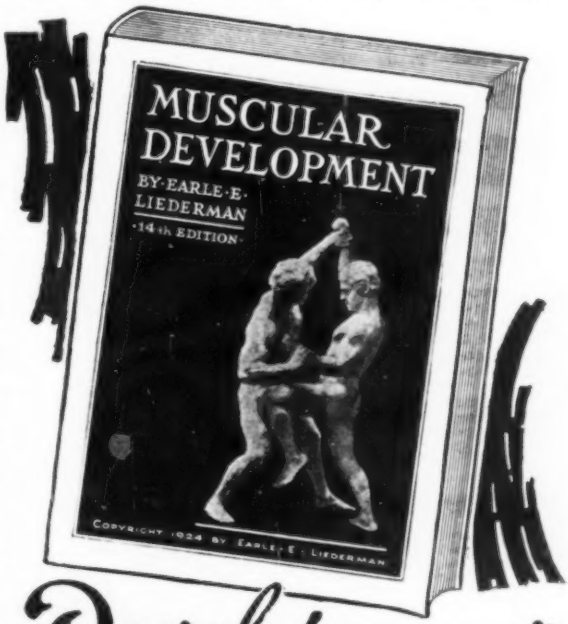
After following Liederman's instructions the first thirty days, a miracle happened. I noticed a wonderful change in my breathing. My blood tingled and my entire appearance surprised everyone who knew me. No longer did I see my friends nudging each other and shake their heads as if to say, "It's too bad, he's going fast." No! I fooled them all. I got well and strong and became a fine specimen of physical manhood. I never dreamed that I would be able to swim, run, jump or do anything that my heart desired. After a few short months, I was fearlessly able to throw caution to the winds.

After the foundation for my health was laid, the rest came easy. I added real healthy muscle around my bones, I acquired that springy step which bespeaks the healthy person. My eye sparkled like crystal. My body just tingled with energy—I was pep from head to foot. I lost my slump—I acquired a feeling up and down my spine which made me know that I had real healthy life in me and many more happy, healthy years to look forward to. Yes, I lived and am living now for the first time. That is why I hiked from 'Frisco—I wanted to show Liederman what a wonderful man he made out of me—I wanted to prove to myself that my strength and endurance were real.

It's a Cinch to Enjoy Life

I don't care who you are or what your health ambitions are, I know that Liederman can do for you what he did for me. If you want to add muscles to your arms, legs or chest, Liederman guarantees to put one solid inch on your arm and two inches on your chest the first thirty days. I know this guarantee means something because he did it for me. I asked Mr. Liederman to make this announcement to the world about my case because I want other seekers of health and strength to enjoy the great benefits of his system of muscular development.

Mr. Liederman will send you his big 64 page book telling all about his method and he will gladly send it to you free—read the next paragraph in which Mr. Liederman tells you all about the contents of this free 64 page book on Muscular Development.



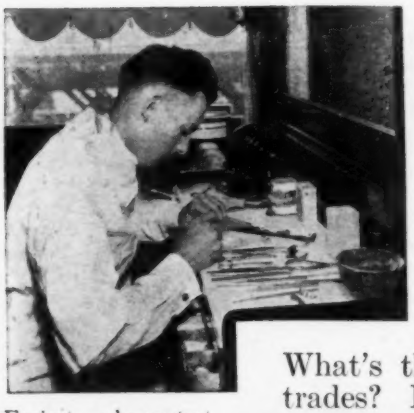
Send For My New 64 Page Book "Muscular Development"

IT IS FREE

It contains forty-eight full-page photographs of myself and some of the many prize-winning pupils I have trained. Many of these are leaders in their business professions today. I have not only given them a body to be proud of, but made them better doctors, lawyers, merchants, etc. Some of these came to me as pitiful weaklings, imploring me to help them. Look them over now and you will marvel at their physiques. This book will prove an impetus and a real inspiration to you. It will thrill you through and through. The book is yours. I want you to have it with my compliments. Keep it. This will not obligate you at all, but for the sake of your future happiness and health, do not put off. Send today—right now before you turn this page.

EARLE E. LIEDERMAN
Dept. 2012 305 Broadway New York City

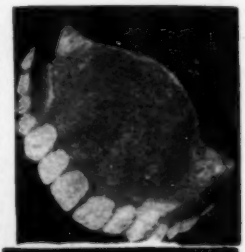
It Is FREE	DON'T SEND ONE PENNY — YOUR NAME AND ADDRESS ON A POSTAL WILL DO	EARLE E. LIEDERMAN, Dept. 2012, 305 Broadway, New York City. Dear Sir: Without any obligation on my part whatever please send me a copy of your latest book, "Muscular Development." Name..... Address..... City..... State..... (Please write or print plainly.)



This Dental Laboratory Expert earns $20 a day!

What's the use of training for the old, overcrowded trades? If you're going to prepare for big-salaried jobs or a profitable business of your own GET INTO THE NEWEST PROFESSION — *"Laboratory Dentistry."* Biggest opportunity for success of the century, because there are ten times as many jobs as men to fill them, because there are a dozen cities crying for Laboratories for each EXPERT capable of operating one!

Easiest, pleasantest work you ever saw! Your own boss, money and success yours from the very beginning. You can start with a "shoe-string." We prepare you in a few months to run a business of your own, to do any job. Common schooling, ability to use your fingers ALL YOU NEED! Free R. R. Fare to Chicago, Cleveland, Detroit, Boston or Philadelphia for a limited time!



Jobs Up to $125 a Week!

In a business where there are many times as many jobs as Experts, salaries are high, hours are easy, opportunities are everywhere! Dentists recognize the high-standing of our graduates. No books here—learn with tools and instruments. Start quick—get ready in a few months for your big opportunity! *Mail Coupon today!*

FREE! R. R. Fare TO Chicago Cleveland Detroit OR Boston

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Learn to make partial upper or lower plates with soldered, cast or wire clasps, with palatal bars; with lingual bars. McCarrie-trained Students learn to make full rubber plates of every type, including Vulcanite base-plates, butted gums, carved gums, etc.

CROWNS

Here's only a small part of your practical training in Crown-work: Two-piece, seamless, open-face, Richmond, cast-base porcelain, Carmichael, split-pin, carved (swaged) cusp, cast cusp, etc.

BRIDGE WORK

Complete training in both fixed and removable bridgework. Interchangeable teeth, gold dummy, Sanitary porcelain dummy jobs—Roach, Gilmore, Bischoff and all forms of cast-clasp work is taught—not with books but in *actual Laboratory*.

METAL BASE DENTURES

Cast bases of Aluminum, Watt's metal, etc., are included in your training. Both centrifugal and air pressure casting machines are used. Free Book contains complete list of subjects in course.

64,000 DENTISTS NEED LABORATORY WORK!

Only a few hundred Laboratories in all the U. S.—most of them in Chicago and New York. Dentists can't afford to do their own mechanical jobs. They can buy the services of a Laboratory Expert at $3.00 an hour and sell their own time at $6 to $15 an hour. Dentists will encourage you to learn mechanical work, start a "Lab" of your own, give them quicker service than sending their work to other cities. Dentists can't wait and keep their patients waiting.

WE HELP YOU OPEN A LABORATORY OF YOUR OWN!

Many of my graduates open a Laboratory of their own. To encourage more men to go into this wonderful profession, we will help you find a good location for your Laboratory, and help you make a success of it. Write for complete information on how you can find yourself in a profitable business of your own after you become a Dental Laboratory Expert.

INTERESTING BOOK—FREE!

Right this minute there are openings for 150 Dental Laboratory Experts in locations where they can do a business of $5,000 to $20,000 a year. But you can't *cash in*, take advantage of these OPPORTUNITIES until you're *Trained*. Catalog tells you how quickly and easily you can *get ready*, how hundreds of others have SUCCEEDED! Tells you how you learn in a few months BY DOING ACTUAL LABORATORY JOBS in the world's greatest *Dental Laboratory Schools*. Brings you FREE R. R. Fare offer and other big inducements. *Write for free Catalog today!*

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Without obligation, please send me your *Free R. R. fare offer* and free Book with complete information about how I may become a Dental Laboratory EXPERT. How you will help me open a Laboratory, how you will help me find a job while I take my training, etc.

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Now President

C. V. Champion of Illinois counts it a "red letter day" when he first read this remarkable book — "Modern Salesmanship." He says "It enabled me to learn more, **earn** more, and BE MORE!" To-day he is president of his company and his earnings exceed $10,000 a year!

In 5 Figure Class

W. Hartie spent ten lean years in the railway mail service before "Modern Salesmanship" put him on the road to big pay. He has earned more in a week than he formerly earned in a month — averaged over $1,000 for thirty days!

Success in One Year

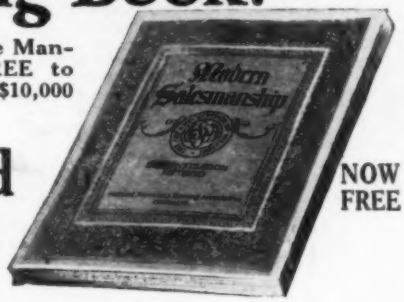
A. H. Ward was formerly a Chicago clerk, earning $25 a week. Within one year he increased his earnings over $1,000 a month—or to $13,500 a year! The book—"Modern Salesmanship"—proved the first rung in his ladder to Success!

700% Increase

F. G. Walsh was a clerk earning $1,000 a year, and trying to support a wife and three children. He had to do something. N. S. T. A. training built up his income last year to $7,286—an increase of over 700 per cent.

—and They Started By Reading This Amazing Book!

Now—For a Limited Time Only—This Remarkable Man-Building, Salary-Raising Volume Is Offered FREE to Every Ambitious Man! If You Ever Aspire to Earn $10,000 a Year or More, Read It Without Fail.



NOW FREE

Where Shall We Send *Your* Copy FREE?

A BOOK! Just seven ounces of paper and printer's ink—but it contains the most vivid and inspiring message any ambitious man can ever read! It reveals the facts and secrets that have led hundreds of ambitious men to the success beyond their fondest expectations! So powerful and far reaching has been the influence of this little volume, that it is no wonder a famous business genius has called it "The Most Amazing Book Ever Printed."

This vital book—"Modern Salesmanship"—contains hundreds of surprising and little-known facts about the highest paid profession in the world. It reveals the real **truth** about the art of selling. It blasts dozens of old theories, explains the science of selling in simple terms, and tells exactly how the great sales records of nationally-known star salesmen are achieved. And not only that—it outlines a simple plan that will enable almost any man to master scientific salesmanship without spending years on the road—without losing a day or dollar from his present position.

What This Astonishing Book Has Done!

The achievements of this remarkable book have already won world-wide recognition. The men who have increased their earning capacities as a direct result of reading "Modern Salesmanship" are numbered in the thousands. For example, there is E. E. Williams of California who was struggling along in a minor position at a small salary. "Modern Salesmanship" opened his eyes to things he had never dreamed of—and he cast his lot with the National Salesmen's Training Association. Within a few short months of simple preparation, he was earning $10,000 a year! Today he receives as much in 30 days as he used to receive in 365!

And then there's J. H. Cash of Atlanta. He, too, read "Modern Salesmanship" and found the answer within its pages. He quickly raised his salary from $75 to $500 a month and has every reason to hope for an even more brilliant future. And still they come! W. D. Clenny of Kansas City commenced making as high as $850 a month. F. M. Harris, a former telegrapher, became sales manager at $6,000 a year. O. H. Malfroot of Massachusetts became sales manager of his firm at a yearly income of over $10,000 a year!

From $15 a Week To $7,500 a Year!

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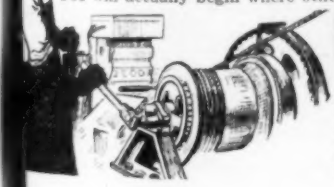

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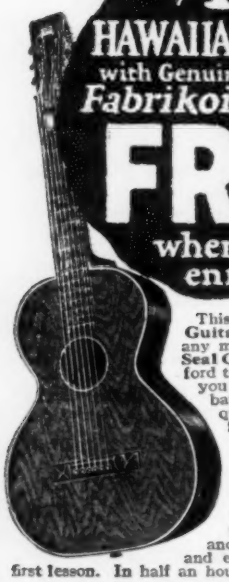

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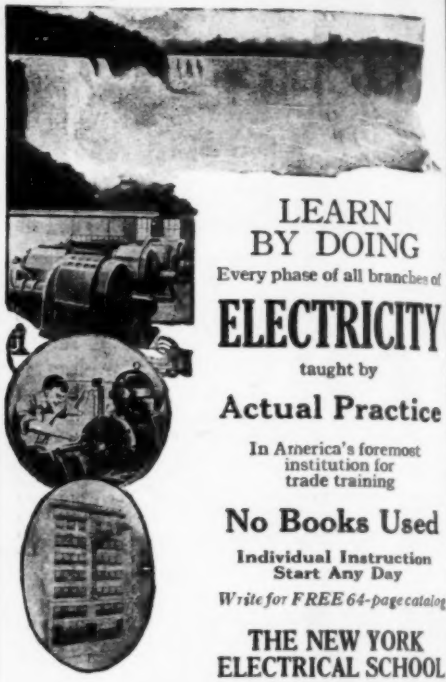

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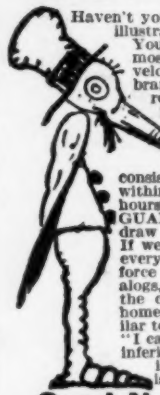

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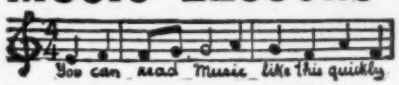

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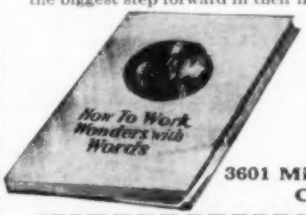

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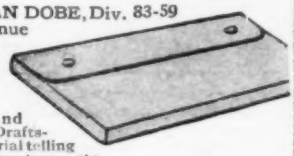

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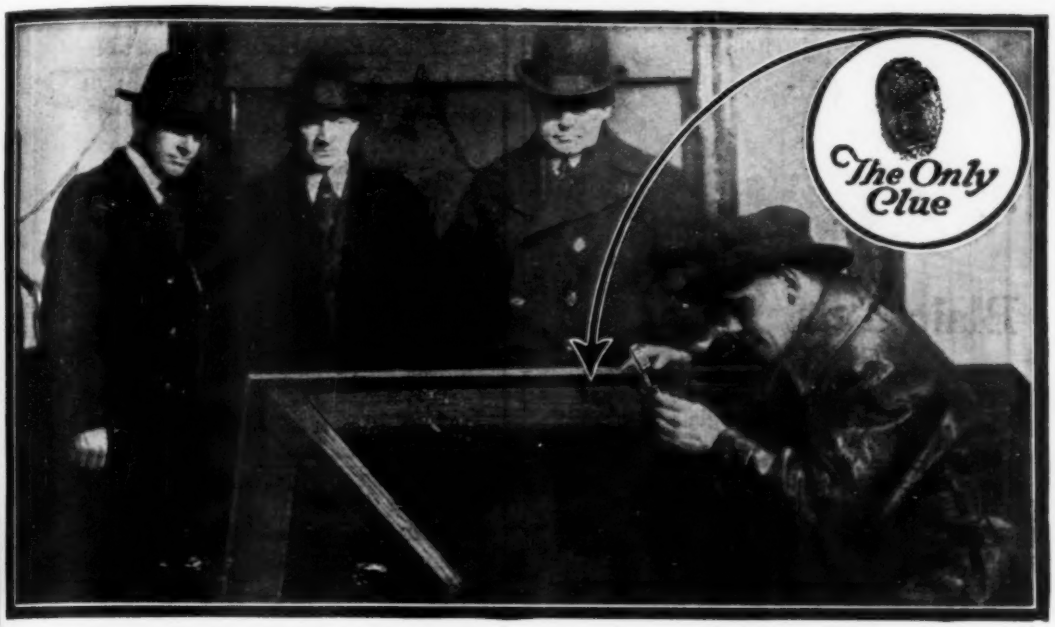

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Almost immediately Bigelow turned his attention to a heavy table which had been tipped up on its side. Examination of the glossy mahogany showed an excellent set of finger prints. The thief might just as well have left his calling card.

To make a long story short his prints were photographed and taken to Central Office, where they were matched with those of "Big Joe" Moran, a safe blower well known to the police. Moran was subsequently caught and convicted on Bigelow's testimony and finger-print proof. Most of the money was recovered. In the meantime the T— O Company had offered a $500.00 reward, which was given to Bigelow—his pay for two hours' work.

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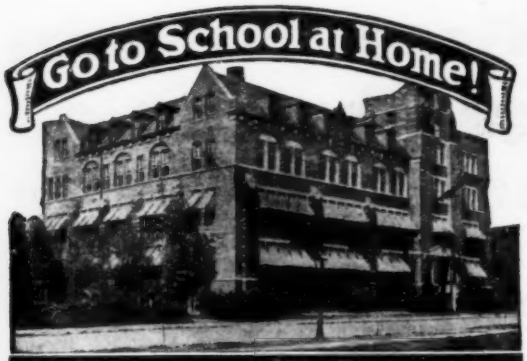

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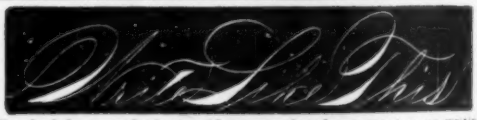

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"Can he really play?" a girl whispered. "Heavens, no," Arthur exclaimed. "He never played a note in his life."

They Laughed When I Sat Down At the Piano But When I Started to Play!—

ARTHUR had just played "The Rosary." The room rang with applause. Then to the amazement of all my friends, I strode confidently over to the piano and sat down.

"Jack is up to his old tricks," somebody chuckled. The crowd laughed. They were all certain that I couldn't play a single note.

"Can he really play?" I heard a girl whisper to Arthur.

"Heavens, no," Arthur exclaimed. "He never played a note in all his life. . . . ."

I decided to make the most of the situation. With mock dignity I drew out a silk handkerchief and lightly dusted off the piano keys. Then I rose and gave the revolving piano stool a quarter of a turn. The crowd laughed merrily.

Then I Started to Play

Instantly a tense silence fell on the guests. I played the first few bars of Beethoven's immortal Moonlight Sonata. I heard gasps of amazement. My friends sat breathless—spellbound! I played on.

A Complete Triumph!

As the last notes of the Moonlight Sonata died away, the room resounded with a sudden roar of applause. I found myself surrounded by excited faces. Everybody was exclaiming with delight—plying me with rapid questions . . . "Jack! Why didn't you tell us you could play like that?" . . . "Where *did* you learn?"—"Who *was* your teacher?"

"I have never even *seen* my teacher," I replied. "And just a short while ago I couldn't play a note."

"Quit your kidding," laughed Arthur, himself an accomplished pianist. "You've been studying for years. I can tell."

"I have been studying only a short while," I insisted. "I kept it a secret so that I could surprise you folks."

No Teacher Needed

Then I told them the whole story.

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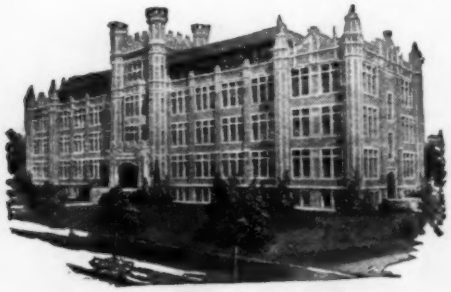

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Before me, a notary public in and for the state and county aforesaid, personally appeared H. H. Windsor, Jr., who, having been duly sworn according to law, deposes and says that he is the editor and business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit: First. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 200 East Ontario St., Chicago, Ill. Editor, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Managing Editor, L. K. Weber, 200 East Ontario St., Chicago, Ill. Business Manager, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Second. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) L. R. Windsor, 200 East Ontario St., Chicago, Ill.; H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill., Lina B. Windsor and Henry H. Windsor, Jr., Executors of the Estate of Henry H. Windsor, deceased, Chicago, Ill. Third. That the known bondholders, mortgagees, and other security holders owning, or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None. Fourth. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. H. H. WINDSOR, Jr., Editor and Business Manager. Sworn to and subscribed before me this 29th day of September, 1928. J. GRAHAM, Notary Public. (My commission expires June 17, 1928.)

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They Gave Me the Ha-Ha! When I Asked for a Dance

-but When I Stepped on the Dance Floor–

By Fred Kennedy

HOW the boys laughed! Ha! ha! ha! They had just seen me ask Mabel for a dance. They stared—amazed at what they considered "my nerve."

"Why, Fred can't dance, can he?" I heard one of them whisper excitedly.

"No; he never danced a step in his life!" came the reply.

Even Mabel, the girl I had asked to dance, looked at me rather questioningly. "You really know how to dance, don't you?" she asked.

Just then the music started. For answer I tightened my arm around her and swept her out on the dance floor in a graceful waltz.

An instant change came over my friends' faces. I heard gasps of astonishment. "Look at Fred dance!" "Where did he learn?"

I kept on dancing—did all the latest steps—glided through all the newest figures. The music—the soft lights—my lovely partner—all seemed to intoxicate me, seemed to thrill me. I danced as I had never danced before!

A Complete Triumph

When the music stopped, my friends all congratulated me. "Fred, you're a wonder," they declared. "Where did you learn to dance like that?" "You dance like a professional!"

I told them—told them about Arthur Murray, America's foremost dancing instructor—told how I had taken his famous course in dancing.

"But isn't that course terribly expensive, Fred?" some one questioned. "Arthur Murray teaches so many of those high society people."

"Not expensive at all," I replied. "I didn't take personal lessons. That isn't necessary. I took his new Home Study course, which costs only a few cents a day!"

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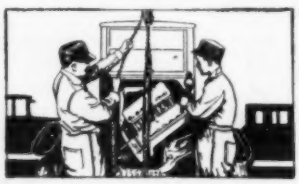

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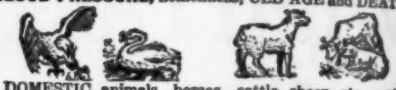

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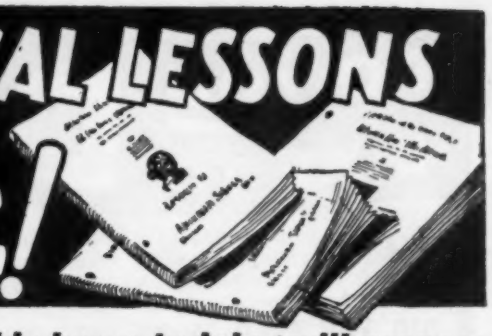

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DID YOU EVER THINK what a pleasant and profitable profession is open before anyone with a talent for drawing? Commercial Artists and Illustrators make big incomes, the work is extremely interesting and enjoyable and is exceptionally well paid. Many artists engaged in this work make from $5,000 to $10,000 a year and more drawing for newspapers and advertisers. Huge prices are paid for Illustrations, Cartoons and Designs for Advertisements and Posters. Editors, publishers and advertisers are always looking for new and interesting drawings and are willing to pay good prices for them.

OPPORTUNITIES ABOUND in this wonderful profession for anyone who has a liking for drawing. No profession offers such opportunities today as does Commercial Art and Illustrating. The tremendous increase in advertising and illustrated publications has created such a demand for competent artists that the field of commercial art and illustrating is a real gold mine for the man or woman who likes to draw.

LEARN AT HOME There is no need for you to leave your home in order to study this delightful and absorbingly interesting art. You can study anywhere under our resultful system of correspondence instruction with which you have the help and guidance of artists high in their profession.

If you are FIFTEEN years of age or over

Copy this Sketch

and send it to us for Free Criticism

and let us judge for you whether you have a talent for Drawing. The criticism is entirely free to persons FIFTEEN years of age and over. Age must be stated on your sketch. No sketches will be accepted from anybody under FIFTEEN years.

2 ILLUSTRATED BOOKS FREE

Let us also send you an actual Specimen Lesson Book, Number Twenty-five from our Course of Instruction as supplied to regular students. This Lesson Book is entitled "How I Do My Work" and has been written and illustrated by eight prominent artists. Each artist explains in simple language the working methods which he uses in his own studio. This Book contains forty illustrations of which fourteen are in color.

"Drawing for Pleasure and Profit" is another book which we will send you free. It is an unusual publication of real value to anyone with a liking for Drawing and gives you hundreds of very interesting facts about Illustrating, Commercial Art and Cartooning. We will send you these two books absolutely FREE when returning your sketch.

2 BOOKS FREE

THE NORTH AMERICAN SCHOOL OF DRAWING
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Railway Postal Clerks now get $1900 the first year, being paid on the first and fifteenth of each month. $79.16 each pay day. Their pay is increased $100 and $150 a year. The maximum is $2700 a year. $112.50 each pay day. They get extra allowance for hotel expenses when away from home.

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Railway Postal Clerks, like all Government employees, are given a yearly vacation of 15 working days (about 18 days). When on runs they usually work 3 days and have 3 days off duty or in the same proportion. During this off duty and vacation, their pay continues just as though they were working. When they grow old, they are retired with a pension. As Railway Postal Clerks are continually traveling, they have an excellent chance to see the country. They are furnished with a railroad pass.

City Mail Carriers—Post Office Clerks

Clerks and Carriers get $1700 the first year on regular and automatically increase $100 a year to $2100 with further increase to $2300. They also have 15 days vacation. Examinations are frequently held in the larger cities. City residence is unnecessary.

What Will You Earn 5 Years from Now?

Compare these conditions with your present or your prospective condition, perhaps changing positions frequently, kicking around from post to pillar, no chance in sight for PERMANENT employment; frequently out of a position and the year's average salary very low. DO YOU EARN $1900 EVERY YEAR? HAVE YOU ANY ASSURANCE THAT A FEW YEARS FROM NOW YOU WILL GET $2700 OR MORE A YEAR, EVERY YEAR?

Get Free List of Positions

Fill out the coupon. Tear it off and mail it today—now, at once. DO IT NOW—This investment of two cents for a postage stamp may result in you getting a U. S. Government Job.

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Rural Mail Carrier	($2100-$3300)
Clerk in Government Offices	($1140-$1860)
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Learn more about the wonderful money-making opportunities in cartooning, and how this method makes it easy for you to learn. Read about our students—their success—what they say—how easy it was—actual reproductions of their work—how they made big money while studying. Booklet entirely free. Send for it NOW. Washington School of Cartooning, Room 3012-D, 1113-15th St., N. W., Washington, D. C.

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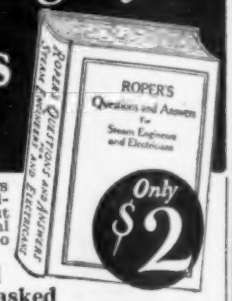

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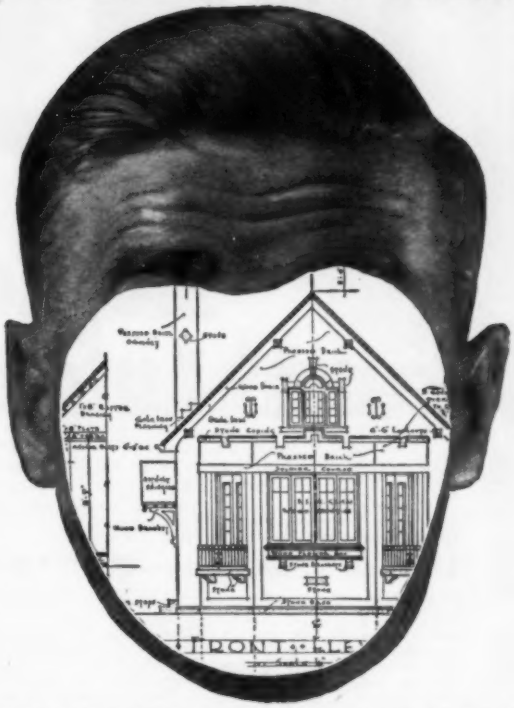
A FRANTIC CALL FOR MEN WHO CAN READ BLUE PRINTS OF BUILDINGS

Leads Quickly to Jobs Paying $4,000 to $12,000 a Year



See how easy it is to get in the building game. Nowhere else does such simple training count for so much. Nowhere else can a man make $4,000 to $12,000 a year so quickly and so easily. Nowhere else are there so many countless thousands of openings as there are with contractors, builders, and real estate firms, who are constantly calling for men who can read blue prints. Six billion dollars a year is spent for building. Trained men are at a premium in this gigantic industry. Untold thousands are needed at steady salaries far above the scale wage.

90 DAYS EASY TRAINING PUTS YOU IN THE 6 BILLION DOLLAR BUILDING FIELD

NO longer is it necessary to start at the bottom of the building trades and spend years to work up. Now you can get three years' training in three months. There are no barriers to your success in the great outdoor building field. You do not need more than a common school education. We train you at home, in spare time, by the fascinating blue-print method with lessons that are as easy to read as your newspaper.

These tested plans come to you from one of the oldest and largest schools of building construction and superintendence in the country. This course is endorsed by leading contractors and master builders. These tested, practical plans and lessons are the kind of training that puts men in $5,000 to $15,000 jobs and in profitable building and contracting businesses of their own. You learn from actual blue print plans—from practical building experts—you learn how to read all the plans, estimate the costs and supervise the entire construction of a building—you learn everything a contractor has to know when he undertakes the construction of a building.

Amazing opportunities are open to you when you know blue prints, plans, estimating and construction. There is building superintending—the best outdoor profession on earth—that pays handsome salaries and often a bonus for efficient work. Clifford Scholl went from clerk to Ass't. Superintendent at 49% increase in salary in 8 months. Thousands of builders and contractors need men like Clifford Scholl.

IF YOU LIVE IN OR NEAR CHICAGO

Visit our School for Builders, open day or evening. Thousand men attend each year. Enter any time. You can get the same training *at home*, by mail. Same plans; same lessons; same instructors. The Coupon brings all facts *Free*.

Every Job Must Have A Contractor

The building field is wide open for men who want to go into business for themselves. Henry Mehl, Pa., a policeman, now owns his own contracting business. Burgert, Ill., stepped into a foremanship at 200% increase in salary. Busch, Kan., writes, "I have been offered $300 a month several times." Boyes, Can., writes, "Your school has increased my wages 40% already." Patrick, Mich., says: "My salary has been increased 92%." Marchand, La., writes, "I am getting along fine. My salary is now increased 196%."

If you really want more money—if you hope to own a business of your own—get into the building business . . . no matter what your job is now. No overcrowding in this tremendous field—room for thousands every day. Why buck competition in crowded industries where only a few men can succeed?

Clerk or carpenter—office man or bricklayer—salesman or superintendent—it makes no difference. You can get into the building business quickly . . . easily. Or if you are in it at present, get this training now, that you must have for success.

FREE Trial Lesson

Simply mail the coupon below for an intensely interesting free book "How to Read Blue Prints," and full information. See what fascinating fun this first trial lesson is. Get these facts before you. See what amazing opportunities open up for you in the Six Billion Dollar Building Field. Don't wait or delay. Act now. Simply mail the coupon below.

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Dept. W-10, Chicago Tech Bldg.,
118 E. 26th St., Chicago

Chicago Technical School for Builders,
Dept. W-10, 118 E. 26th Street, Chicago, Ill.

Send me, without obligation, your free book, "How to Read Blue Prints" and full details of the course and the opportunities in the Building Field. It is understood that no salesman will call on me.

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You want to earn more money. You want to fit yourself for a better job or a business of your own. The automobile business is your opportunity. **Thousands** of trained men are needed **right now.** Come to Detroit now and learn this business right. Then go out, a trained man. **Earn Big Money.**

Three-quarters of all the cars are made right here. Study autos where they are made. Learn at the "Old Reliable" **Michigan State**—endorsed by the auto makers. They approve our courses of training because they are complete and because our instructors are experts. We know how to **train you right,** and that is what you want.

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Without any previous experience—just a liking for mechanics—you can learn the automobile business in a few short weeks here at the "Michigan State." Take a full Automotive Course in 12 weeks. Or our great **Master Course** in 30 weeks. Or specialize in any one of its money-making branches; you can be an Auto Electrician; a Tire Expert; a Battery Service Man; a Repair Man; a Welder; a Machinist. Course includes training in Garage Management, Business Methods and Selling. Classes always open. You need make no special arrangements—start at once—now. The cost is low and terms easy. Any man, anywhere, can afford it.

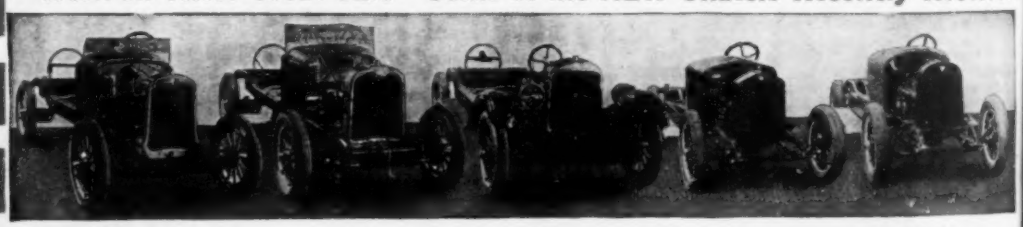
Earn While You Learn

If necessary we can assist students to secure part time work to earn money each week. Or students who wish to take our evening course will be assisted to full time day jobs. Ask for details, and when writing please explain your circumstances fully.

We Help to Get Jobs

"Michigan State" trained men are wanted, in Detroit, in your home town, in garages throughout the country. We place many of our graduates directly. This Employment Service is absolutely free. L. T. Middlebrooks (Cal.) writes: "Getting the best pay I ever received and all credit to the M. S. A. S."

Work on These Great Cars—Some of the NEW Chassis Recently Received



Oldsmobile **Oakland** **Jewett** **Essex** **Hudson**

The chassis in this picture are the latest models, just received. Our location in Detroit, the Automobile Center of the World, and our reputation for giving Quality Training only, brings us the close co-operation and endorsement of the automobile manufacturers. This means much to you. You always find the latest and most up-to-date equipment at the "Old Reliable" Michigan State. Our equipment is continually being improved and is now better than ever.

100,000 Trained Men Needed Now

Where can you find such an opportunity as this? The Auto Business has grown to be the biggest business in the world. Its volume is more than steel or railroad industries. A hundred thousand more trained men are needed. The field is getting bigger all the time. Green men can't draw the good pay. But trained men can. E. J. Asbury (W. Va.) says, "I am clearing $50 a week just at home. Haven't even got a shop yet."

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Note that we don't promise to put you on top of the world in a few weeks. We know the **great need** for skilled men, and the wonderful future ahead of you if you get started now. But we know it takes work. It takes real knowledge. And that we can give you. Then start in a good job and advance to big money. Auto knowledge means steady work, wherever you want to go, at good pay, and a certain future. **Send the coupon for Big New Book and find out for yourself.**

MICHIGAN STATE

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Learn Autos Where Autos Are Made

The AUTOMOBILE CENTER

Learn at the School Endorsed by the Manufacturers

The auto makers are the best judges of an auto school. They know how training should be given. They know the "Michigan State" training is right. That is why they endorse this school. The auto makers helped outline our courses, they furnish us equipment, they employ our graduates. When they say **you will make no mistake** in coming to the "Michigan State" their advice is worth a lot to you.

Detroit Trained Men Earn More Money

Detroit trained men get preference every time and get jobs quickly. Customers will go miles out of their way to take their jobs to a Detroit trained man. It brings you business, jobs, success, highest pay. The "Michigan State" diploma is a valuable money-making asset.

Get Into the Auto Business NOW!

Be a skilled repair man. There are over 20,000,000 cars in the U.S.A. alone. What a chance for the trained man! Car owners search for reliable repair shops. Garage owners advertise for competent mechanics. They don't want **green** men. But the skilled auto man always has a job.

More good garages, battery shops, tire shops, welding shops and electric service stations are needed. Open a shop any place, right at home where your friends are; or in some other town or at country cross-roads. **Make Big Money.**

Home Study Course

For those who cannot come to Detroit for their training, we have a special Home Study Course. This course covers the same subjects in detail as our Residence Course. You get the same practical training with the exception of the actual work on the cars. The knowledge you gain in the first week or two in the Home Study Course should enable you to get a job in a garage right away. This is your big opportunity. Don't delay. Under New Plan the Home Study Course is FREE to students who later take the Residence Course. Say which course you prefer.

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The former Packard service manager trains our students in the **business end** of running a garage. This training is worth $100 alone, but it costs you nothing extra. Another one of the **big** advantages of Michigan State training. All students get this Business Course without extra charge.

SEND COUPON NOW

Get all the interesting facts. Mail the coupon for Big FREE Catalog and information concerning **your future** that you must not fail to get. It's illustrated with photos of school equipment and factory production included in our weekly inspection trips, also hundreds of letters from our successful graduates. It tells you how you can get a good paying job—how you can go into business for yourself with little capital. Mail the coupon or send us a postcard today. **Write now.** (We do not enroll colored students, except for our Home Study Course.)

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Mail Today!

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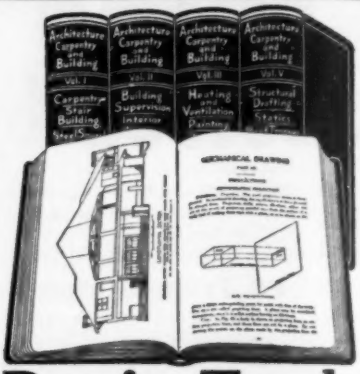

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For Architects, Draftsmen, Carpenters, Contractors, Builders and all who expect to build

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I can give you poise that banishes self-consciousness, charm that makes you irresistibly popular, personal power that will indelibly influence the minds of others and amaze your friends.

I'll make you a fascinating force in social life, a powerful, dynamic, commanding figure in your profession. You'll become more popular, more prosperous, more gloriously successful than you ever dreamed possible!

Let me send you the proof—absolutely free! If within 5 days you do not experience a decided change in your personality, if you do not find yourself making new friends with ease, if you do not discover yourself already on the way to social popularity, business success and personal leadership—just say so. Tell me my principle of personal magnetism can't do every single thing that I said it would do. And you won't owe me one penny!

What Is Personal Magnetism

What Is Sex Magnetism?

What is that magnetic, powerful influence that draws one man to one woman—forever, irresistibly? What is that strange never-failing spark that awakens love? What is it, in man or woman, that seems to draw and fascinate—the hypnotic power that no one can resist?

You have it. Everyone has it. *But do you use it?*

What is this marvelous force that raises the sick to glowing, vibrant health, the timid to a new confident personality, the unsuccessful to positions of wealth and astonishing power?

You have it—everyone has it—*but not one person in a thousand knows how to use it!* It is not a fad nor a theory. It is simply you, yourself—your manner—your own marvelous personal force, released and magnified a hundred fold in an amazingly clear-as-crystal, scientific way! More necessary than good looks. More valuable than money. For without it a salesman is handcuffed! Without it a business man is powerless to command! No actor, no teacher, no orator, no statesman can long hold his audience spellbound without this supremely influential magnetic force!

Personal magnetism! How easy to release it! How wonderful its results! No long study or inconvenience. Not the slightest self-denial. Just a simple, clear, age-old principle that taps the vast thought and power resources within you, releases the full sweep of your magnetic potentialities and makes you almost a new person from what you were before!

Personal Magnetism is not hypnotism. Hypnotism deadens. Magnetism awakens, inspires, uplifts. Personal Magnetism is not electricity. It is *like* electricity in one way—while you cannot see it, you can observe its startling effects. For the moment you release your Personal Magnetism you feel a new surge of power within you. You lose all fear. You gain complete self-confidence. You become almost over night the confident, dominant, successful personality you were intended to be—so fascinating that people are drawn to you as irresistibly as steel is drawn to a magnet!

The Facts Are Free

The fundamental principles of Personal Magnetism have been put into an extra large volume under the title of "Instantaneous Personal Magnetism." It is bound in beautiful dark burgundy, with the title gold embossed. Its scope is as broad as life itself. "Fires of Magnetism," "Sex Influences," "The Magnetic Voice," "Physical Magnetism," "The Magnetic Eye," "Oriental Secrets," "Rapid Magnetic Advancement," "The Magnetic Mind," and "Magnetic Healing," are only a few of the subjects covered in this amazing book. A magnificent book that tells you just how to cultivate the magnetic influence of your nature.

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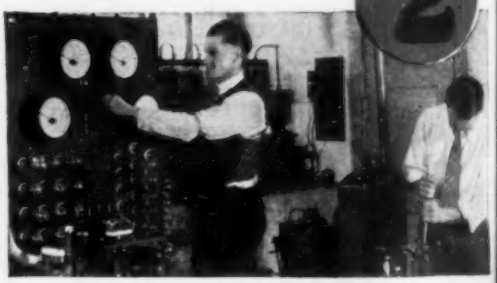

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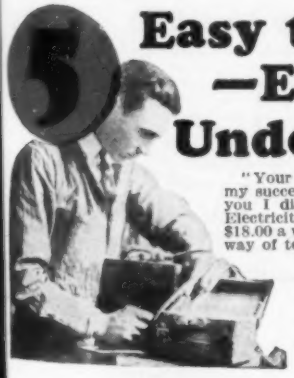

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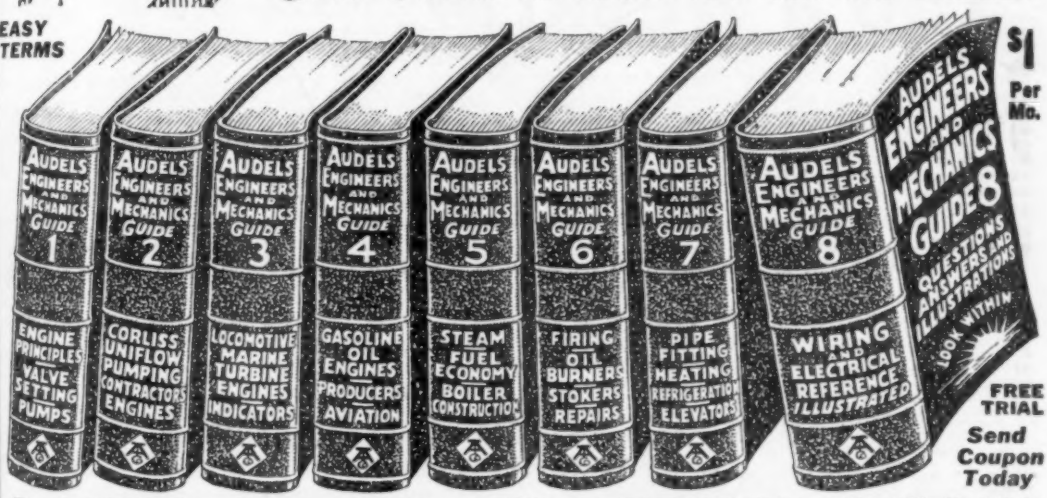

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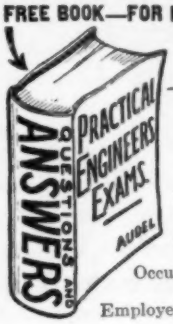

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START a manufacturing business of your own. Earn $1.00 weekly. Make your own products. Formulas, toilet articles, perfumes, soap, extracts, etc. We furnish everything and show you how. Valuable catalog free. National Scientific Laboratories, 1934W Broad, Richmond, Va.

10,000 FORMULAS. Write for Free descriptive folder on Henley's famous Formula Book. Elite Trading Co., 3:1 5th Ave., New York.

10,000 FORMULAS. A real Gold Mine of money-making ideas. Tells how to make almost everything under the sun. You can make and sell cosmetics, mucilage, anti-freeze solutions, battery solutions, beverages, cheese, chewing gum, cleaning preparations, extracts, hair preparations, inks, bluing, leather polish, mirrors, perfumes, polishes, typewriter ribbons, carbon paper, washing powders, liquid soap, and hundreds of other profitable articles. Send No Money. Just write a postal for "Henley's 20th Century Book of Formulas." Pay postman postage and $4. Popular Mechanics Press, 200 E. Ontario St., Room 812, Chicago, Ill.

500 FORMULAS including Luminous Paint—Renewing Dry Batteries—Resilvering Mirrors—Gas Tonic, Puncture Plugger, 25c. Catalog Free. Ideal Book Shop, Park Ridge, Ill.

AGENTS WANTED

I WANT a Partner. Someone to take care of my business in your locality. Make $15.00 daily; show samples; distribute Teas, Coffee, Spices, Extracts, things people eat. I furnish everything complete, including world's finest super-sales outfit. Highest quality products; lowest prices; big permanent repeat business—quality guaranteed by $25,000 Bond. With the person I select as my partner, I go 50-50. Get my amazing offer of Chrysler closed car, "free." Write or wire today. C. W. Van De Mark, Dept. 100M, 117 Duane Street, Cincinnati, Ohio.

CHRISTMAS Specialty. Beautifully tinseled art cards, 14x22 inches, all reading "Christmas Greetings, Best Wishes for the New Year"; worth $3.00; anyone can sell one or more quickly at $1 or more, each, to nearly every store; cost you 50 cents each; 10 or more 35 cents; 100, 30 cents; 1,000, 25 cents, delivered; active men sell 50 to 100 a day. Write quick for free literature to Consolidated Co., 65-M West Van Buren St., Chicago.

NECK chains—now is the time to sell them for Christmas. Two hand-made bead chains twenty inches for less than the price of one. Send $1.00 get two chains—sell one for $1.50. J. A. Weber, 4311 Ravenswood Ave., Chicago.

AGENTS: $11.80 Daily in Advance, Introducing New Insured Hosiery for Men, Women, Children. Must wear or replaced free. Nyland made $595 one month; Edwards, 460.60; Mrs. Bone, $425.45. Why not you? Even spare time should pay $3.00 an hour. 57 styles, 39 colors including latest "Silk to the Top" ladies' hose. No experience needed. We furnish samples. Silk hose for your own use free. New Plan. No matter what you are now doing, write quick. Macochee Hosiery Company, Card 25612, Cincinnati, Ohio.

AGENTS—$11.80 Daily in advance (Sworn Proof) Introducing New Insured Hosiery. Guaranteed one year. No capital or experience required. Your pay daily. Monthly bonus besides. We supply samples. Silk hose for your own use free. M. H. Mathews, Card 58612, Cincinnati, Ohio.

GREETING Cards—All Kinds. Fancy, Silk-Gelatine. English, German, Spanish. Klees Company, 1710 Undercliff Avenue, New York.

SALESMEN Selling to Men. We have logical side line for you that will sell along with any other line you may now be handling and probably make more money for you, provided you are now selling to men. Get full facts at once by addressing Salesmanager, 844 West Adams, Dept. 628, Chicago.

SALESMEN: Write your name and address on a postal nd mail to us. We'll show you sure earnings of $20.00 a day. Will you risk one minute and a one cent stamp against $20.00? Mind you, we say we'll Show you. Address Dept. 1052, William C. Bartlett, Inc., 850 W. Adams St., Chicago.

DIXIE Two-Color Sign Cards—300% Introducing, then $5 establishing local agency. Sample and catalog, 6c. Camer, 1125 Royal, New Orleans.

REAL Money selling a great new Health Invention generating Violet Ray, Vibration, Electricity and Ozone. Exclusive Territory now open. Write today. Lindstrom & Co., 20 W. Lake St., Dept. 93-59, Chicago.

BIG money-making opportunities; No pedding. Particulars free. Elite, 38 Elizabeth St., New York.

CAN you sell an article everyone needs, actually worth $2.00, for 97c; give away an article everyone wants; retail price 50c, and still make over 100% profit? Eureka Co., Dept. A, Fairfield, Iowa.

REPEATER Corn Killer 1½c. Sample 25c. Moyes, 1234P Clay, Paducah, Ky.

AGENTS. Write for free Catalog. 100 Sure Sellers. House Dresses, Hosiery, Underwear, Shirts, Blankets, Flannels, Novelties, Etc. Economy Sales Co., Dept. 526, Boston, Mass.

PATENTED Pocket Chair. Big money being made by agents everywhere; sells on sight to motorists, campers, tourists, football fans—wherever chairs are needed. Folds to pocket size. Weighs 1½ lbs. Indestructible. Send for sample. Glasvin Import, 96 Fifth Ave., New York.

65 MILES on 1 Gallon—Wonderful Gas Saver. All autos. 1 free. Critchlow, 895-J, Wheaton, Ill.

AGENTS Wanted. Full or part time, to sell on liberal commission, new Thermostatic Automatic Carburetor Control Attachment, for Ford cars. Increases mileage 100 per cent. No holes to drill. Attached in 2 minutes. Does automatically exactly what Ford Manual instructs driver do by hand. Cadillac now using Thermostatic Carburetor Control under Blancke license. Write at once. Blancke Auto Devices Co., Dept. 805-T.X., 157 E. Erie St., Chicago, Ill.

SENSATIONAL 2 for 1 Offer. "Bonds Clothes" are big sellers. Suit and overcoat or two suits for $29.50. Dress and business clothing made to fit and fit to wear. Latest designs. Venetian lined. $65 to $150 weekly. $5.00 profit. Free outfit includes large double swatch samples (11"x28"). John Bond Tailoring Co., Dept. D12, Jackson and Desplaines, Chicago. Satisfied customers from coast to coast for 37 years.

FOR Christmas. Our Luminous Crucifix shines in the dark and makes a wonderful Christmas present. Our agents always clean up with this Crucifix at this time. W. G. Hannan Co., Dept. B, 2539 S. State St., Chicago.

AGENTS: It's a winner. Combined cigarette and match case. Black grain finish leatherette. Holds Package cigarettes and box matches. Sells on sight. Big profits. Write for details. All-In-One, Dept. A-12, 2810 Portland, Minneapolis, Minn.

AGENTS wanted: To sell the new "Wonderlamp" magnetic trouble light that every motorist will buy on sight. No experience necessary, either full or spare time (evenings). $5.00 an hour easily made. Wonderful Christmas Gift. If you want to make real money send stamp for particulars. Wonderlamp Company, No. 919 Fisk Bldg., New York City.

START a manufacturing business of your own. Earn $100 weekly. Make your own products. Formulas, toilet articles, perfumes, soap, extracts, etc. We furnish everything and show you how. Valuable catalog free National Scientific Laboratories, 1934W Broad, Richmond, Va.

AGENTS Rubber Specialties, house dresses, undergarments, sleeping apparel combined to insure large earnings for you. B. & G. Manufacturing Co., Dept. 993, Pittsburgh, Pa.

WRITE for free catalog to sell Nationally Advertised Radio in your own locality. Dept. 5, Harry Berg Co., 304 Hennepin, Minneapolis.

MILLIONS of billfolds are sold every Nov. and Dec. for Xmas presents. Samples sent prepaid. Agents wanted. Get my combination billfolds, check book, and lodge card holder, $1.50 prepaid. Send all orders to F. E. Williams, Hotel Roslyn, Los Angeles, Calif.

WOMEN—$2 an hour spare time; new idea sanitary necessity; sells on sight; every woman buys; new feature never before used; designed by physician; revolutionizes old uncomfortable methods; pay every day; no deliveries, no collections, no experience or capital required. Particulars mailed in plain envelope. Don't delay; write Mrs. Mary P. Coleman, Meriden, Conn.

AGENTS—Big money in spectacles wholesale prices. Snoddy Co., St. Louis, Mo.

GENUINE Gold Leaf Letters anyone can put on Store windows. Guaranteed to never tarnish. Large Profits. Enormous Demand. Free Samples. Write today. Metallic Letter Co., 438-D North Clark, Chicago.

"LIQUID-LEATHER" Fills Holes in Shoes, Rubbers, Tires. Dries Instantly. Pliable, Waterproof. Just Imported from France. Tube Retails 75c—Cost 35c. Sells Housewives, Sub-Agents. Nulife Leather, Hartford, Conn.

REFLEX Golf Sticks sell! $15.00 a day easily made by agents. Every golfer eager to buy golf's greatest and newest invention. Improves any player's game. Highly endorsed by prominent professionals. Write for details. The Reflex Manufacturing Co., 18 West Seventh St., Cincinnati, Ohio.

MAKE and Sell "Waterless Hand Soap"; "Metal Polishing Cloth"; "Rainshed Windshield Wiper." Three Guaranteed Formulas $1.00. Formula Catalog Free. Clover Laboratories, Dept. H, Park Ridge, Ill.

AGENTS $72 a week—Biggest line Guaranteed Cutlery ever offered. Knives, Razors, etc. We give exclusive territory. Extra commission. Big money for spare time. Write for Samples. Novelty Cutlery Co., Dept. 831, Canton, Ohio.

WE Have a Real Proposition. No Canvassing. Big Profits. Repeats Year Round. Complete Plan and Sample 25c. Fadco Sales Service, Windfield, Pa.

A PERMANENT Position and Good Income is open to man or woman handling our goods in your locality. Established 35 years. No experience or capital. Full or part time. Dignified work. Write Employment Dept., Winter Company, 19 Winter Bldg., Washington, D. C.

AGENTS—Biggest money makers ever offered. Sell offices, homes Bestufone, which makes both hands free while telephoning; Midget Collapsible Garment Hangers, Wonderful Holiday sellers and Everin Keypurse to hold change and keys. G. Kalina Company, 1308 Avenue N, Brooklyn, N. Y.

DISCOVERED! Diamond Rival—Rajah Gems astound Jewelry world and defy detection. Set in artistic Sterling Silver mountings copies of highest priced platinum designs. Sell like wildfire at popular prices. Salesmen and Agents unique selling plan means enormous profits for you. Write immediately for details. Rajah Company, Dept. X12, Salisbury, N. C.

AGENTS make $40 to $80 weekly selling typewriters re-manufactured like new by the "Young Process." Lowest prices and easiest terms ever offered. Big Commission—no investment—real opportunity to start in business for yourself. Write Today. Young Typewriter Co., Dept. 575C, 654 W. Randolph St., Chicago, Ill.

NEWEST invention. Abolishes kinks, snarls and automatically coils telephone and iron cords. Housewives, companies buying 5 to 50. $3.40 outfit Free. Neverknot, Dept. B12, McClurg Bldg., Chicago.

STARTLING new invention, you'll be surprised when you see the improved clips for hanging ornaments on Christmas trees, agents making big money, mail ten cents for box of 100. Universal Novelty Company, 6734 N. Bouvier St., Philadelphia, Pa.

ADD Water to our concentrates and produce high quality foods, beverages, flavorings, toilet, auto and agent's specialties. We furnish labels, containers and concentrated products ready to dilute. Permanent, profitable, exclusive proposition. Deady-Barter Co., Station E-4, Kansas City, Mo.

DIFFERENT Oil Burner sells for $35. Does the work of $300 outfit. Flame control adapts it to store or furnace use. Greatest opportunity for agents in years. Big profit. Write for literature. Home Economy Burners, Inc., 312 Marcellus St., Syracuse, N. Y.

MARVELOUS New Invention, 400% Profit. Liquid Quick Mend for hosiery and fabrics. Tremendous demand. Over hundred other fast sellers. J. E. Johnson Co., Dept. 448, Chicago, Ill.

BIGGEST Little Thing Out. Universal Household Device, day in day out and year round where chairs are used. Big money making Harvest to Agents. Sample post paid 50 cents. Write for particulars. Jos. Bouska & Son, Bridgeport, Wash.

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for Free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 170 and 171.

MAKE beautiful radiator covers with adjustable metal Over-Tops. Beats high-priced covers. Several needed every home, apartment, office, having hot water or steam radiators. Fast sales. Hire others. Big profits surprise you. Interior Arts, Inc., 4523 No. Clark, Dept. 21, Chicago.

MAKE $60 to $100 weekly taking orders for non-generating, life-time guaranteed oil burner; only $15. We deliver, collect and pay you daily. Heat King Oil Burner Co., 230 Reliance Bldg., Kansas City, Mo.

TEN Dollars a Day six days a week selling McNess Products. The repeat business does it. Qualify for Resident Manager and add as much or more to your own earnings. A Big opportunity for a real worker. Write Furst-McNess Co., 506 Sunlight Bldg., Freeport, Ill.

AGENTS — Men—Women: Big profits selling Veripure Vegetable Soap—wonderful new soap for toilet, bath, etc. Write today. Veripure Laboratories, Box 999-C, Chicago.

THE best tooth-paste for Pyorrhea is Zi-O-Dine. Every tube guaranteed. Taste and cleansing qualities wonderful. Fifty cent tubes. Agents wanted. Iodine Products Co., Laurel, Miss.

WOULD $100.00 per week interest you? Millions of photos all over the country just crying to be made into beautiful artistic medallions. We have new plan. Lowest Prices. Speedy Service. Experienced agents losing money every day they put off writing us. Art Medallion Co., Department C, Corner Campbell and Jackson, Chicago, Ill.

AGENTS: 100% profit selling our low-priced beautiful and attractive Felt Rugs. Easiest and surest way of doubling your money. Perfect color combinations win instant admiration and insure quick sales. Excellent opportunity to build substantial business. Eastern Mills, Everett, Mass.

AGENTS — Demonstrators — To sell the Chrisman Ejector Fork—The latest in kitchen utensils—Sample 50c. The Chrisman Manufacturing Co., 301 Anthe Bldg., Covington, Ky.

AGENTS—To sell Catholics—Wonderful Proposition. United Religious Goods Co., 201 United Bldg., Covington, Ky.

AGENTS, Sell office supplies. Dignified work. Meet big business men. Pay daily. Catalog free. Mohler, Box 453, Chicago.

SELL Pocket Adding Machines. Sample $1.40 C.O.D. Wineholt Distributing Co., Woodbine, 54, Penna.

AGENTS make real money. Sell headlight shade for all autos. No rust. No rattle. Guaranteed. Makes night driving safe. Headlight Shades Co., Yankton, S. D.

SPLENDID profits selling self-threading Needles. $50 weekly easy; sell at sight. Write for details. Henco Co., Dept. 23, 246 Fifth Ave., New York.

AGENTS Cain Money. Household specialties. One agent sold 161 one day. G. L. Erwin, 2113 Harrison St., Chicago, Ill.

WANTED—Men and women, sell self-threading needles. Blind men thread them. Sale in every home. Pay $5 a day. Experience unnecessary. Send 10c for sample needle and particulars. Southern Sales Company, Box 168-PM, Mt. Pleasant, Tenn.

$50.00 WEEKLY, pleasant work, applying gold initials on automobiles. $1.45 profit every $1.50 job. Experience unnecessary. Free samples. Ralco Monograms, 1043 Washington, Boston, Mass.

2 WONDERFUL inventions. Startling plan gives customer Free Gold Plated device making old phonograph sound like Orthophonic Victrola. Other abolishes needles. Bradley sold 36 in 36 calls. Everplay, Desk B12, McClurg Bldg., Chicago.

CHRISTMAS Novelty sold stores day or evening. Every store a prospect. Clean up big in December. Active agents make $25.00 per day. Consolidated, 65A West Van Buren, Chicago.

HANZO "Removes the grime—in half the time." Unique sales plan nets you $2.50 every ten minutes. Free samples, advertising circulars. Staple article used by millions. Grab this coin-coaxer. Free sample waiting. Hanzo Company, 765 Waveland Ave., Chicago.

GOLD Sign Letters. $9.75 for Thousand. Non-Tarnishable. Free sample. Catalogue. Atlas Sign Works, 438 Broadway, Denver, Colo.

MAKE Big Money Selling Our Christmas Greeting Cards. Write Today. Buchanan, 63 Court St., Boston, Mass.

CANVASSERS, men and women, to take orders for calendars. Write for particulars. L. Bohden, 103-17 Jerome Avenue, Ozone Park, Long Island, N. Y.

EARN $45 to $85 extra a Week. Selling beautiful Shirts. Commission in advance. We deliver and collect. Write quick. Fashion Wear Shirts, Dept. S-942, Cincinnati.

$31.00 PROFIT—with $1.50 Outfit—Big Money—Easy Work. Selling Gold Monograms for Automobiles, Luggage, Windows, Wagons. No Experience. No License. "Samples Free." NuLife Monograms, Hartford, Conn.

$25.00 DAILY in advance, showing colored slickers and raincoats. $6.50 raincoats $3.95. Outfit free. Prompt delivery. Super Built Garment Co., Box 453, Chicago.

START a manufacturing business of your own. Earn $100 weekly. Make your own products. Formulas, toilet articles, perfumes, soap, extracts, etc. We furnish everything and show you how. Valuable catalog free. National Scientific Laboratories, 1934W Broad, Richmond, Va.

65 MILES on 1 Gallon—Wonderful Gas Saver. All autos. 1 free. Critchlow, 805-I, Wheaton, Ill.

BUY our absolute necessity 2c—sells 25c. We undersell all. Seven samples 30c. Catalog free. Mills Sales Co., 13 E. 16th St., New York.

AGENTS $13 daily in advance. Bonus besides. Introduce finest line guaranteed hosiery you ever saw. 126 styles, colors. Spare time satisfactory. Auto furnished. No experience needed. Credit given. Samples furnished. Wilknit Hosiery Co., Dept. 1431, Greenfield, Ohio.

CHICAGO Diamond Expert overvalued our Mexican Blu-Flash Gem 3,000%! The Diamond's Only Guaranteed rival! Greatest spare-time, side-line agent's article known! Amazing profits! $5 pocket sample case Free! Write quick! Mexican Gem Company, Box P7C, Monterey, Calif.

TAKE orders for guaranteed Bed Spreads. Every woman buys, no competition, outfit free. Household Supply, J1603 Michigan, Chicago.

THANCO Vanilla—Bottle Yourself! Concentrated; add water; free labels. Crushes competition! 500% profit! Immense seller, homes, bakeries, stores. Write Thomas Manufacturing Company, Indianapolis, Ind.

FRENCH and German giftwares, novelties and specialties. Agent wanted. J. Keiser, Schnelsenerweg 5, Hamburg, Germany.

AGENT Makes $57 a day driving nails in tire! Amazing discovery heals all punctures—one tire was punctured 857 times without a leak. Send for Free Sample Offer. O. S. Nelson, T3713 Logan Bldg., Mitchell, S. Dak.

WANT a plan that will sell 9 out of 10? A nationally known line of 200 articles. Write for particulars and $8.00 free sample case. H. Smith, Mgr., 1223 Wabash, Chicago.

MAKE $20 daily selling merchants $1.00 changeable letter display signs. 75c profit every sale. Maze Manufacturing Co., Norwood Station, Chicago.

SELLING Like Blazes! Eleven piece toilet goods assortment at $2.25 with two piece carving set Free to your customers. 100% profit. Davis Products Co., Dept. 56, 1321 Carroll, Chicago.

BIG Profits! Great Demand! Rich's pure fruit Concentrated Soft Drinks. Every home, store, soft drink dealers buys. $10.00—$25.00 Daily easy. Sample free. Sol P. Rich Co., 622 S. Sangamon, Chicago.

DUO Double Strength Extracts in immense demand. Build big permanent business. Also mighty attractive line toilet preparations, household specialties, etc. Duo Co., EX-1, Attica, N. Y.

$5,000 A YEAR—Selling Perry Photo Medallions. Big demand. Ready sales. 400% to 600% profits. Any photo copied perfectly on Medallions, Mirrors, Compacts, Jewelry, etc. Guaranteed likeness. Investigate. Free catalog and full details on request. Write Today. S. Perry Photo Novelty Corp., 1793 Jerome Ave., New York.

AGENTS—500% profit selling genuine gold window letters; Scripts. Experience unnecessary. Free sample. Premier Letter Co., 121 N. Francisco, Chicago.

AGENTS: Make $500.00 before Xmas. Pay Daily. No investment. Rhinestone Initial Buckles and novelties. Big Xmas and all year sellers. Exclusive territory. Chaton Novelty Co., 606 Blue Island, Chicago.

SELL Sanitary Rubber Goods, Stepins, Shadow Skirts. Every woman buys. Free Sample offer. American Rubber Products, Dept. 208, Pittsburgh, Pa.

RAINCOATS—Full line, all prices. Also leather and sheep-lined coats. Big catalog Free. Commissions 25% with bonus. Hydro Raincoat Co., 718 Independence, Chicago.

SELL Radium Water Generators. Entirely new fast seller. Repeat orders sure. Permanent income. Ask why today. Radium Refinery, 2209 Broadway, Oakland, Calif.

AGENTS—Big Seller—$20 Daily Easy selling Taylor Caps—made-to-measure; every man buys; some want 2 or 3 caps. Samples Free and Cap free to agents. Write quick for fast money making proposition. Taylor Cap Manufacturers, Dept. O-6, Cincinnati, Ohio.

AGENTS $180 month. Auto furnished. Introduce Jennings Guaranteed Hosiery. Finest line silks. Pay you daily. Extra bonus besides. New plan. No experience needed. Credit given. Samples furnished. Jennings Hosiery Co., Dept. 2031, Dayton, Ohio.

AMAZING Large Cash Commissions Introducing Beautiful $3.95 and $4.95 Fit-to-Measure Guaranteed Shoes. Actual Samples Furnished. Wire for your territory. Style Arch Shoe Co., Dept. 107-M, Cincinnati, Ohio.

AGENTS—$240 month. Startling new invention. Self-wringing mop. Push button and its wrung. Hands never touch water. New selling plan. Low priced. Territory given. Write quick. Details free. National Products Co., Plan 231, Dayton, Ohio.

AGENTS: $16 day. Distribute $2.25 household articles free to ten thousand new customers for our guaranteed goods. Part time satisfactory. Write for samples today and start quick. Jennings Co., Sample 631, Dayton, Ohio.

BIG Profits. Sell "No-Splash" 4-Strainer Water Filters. Fast sales, lowest prices; send for 6 dozen, $1.80 postpaid. Jones Mfg. Co., 243E3 Franklin St., Boston, Mass.

AGENTS—Here's just the opportunity you've been looking for. $100 a week; free automobile; exclusive territory. Write today for particulars. American Products Co., 6325 Monmouth, Cincinnati, Ohio.

GREATER Profits — Year Round sales. Complete guaranteed line dress and work shirts, overalls, workpants, lumberjacks, leather vests, playsuits. $10—$25 daily easy. We show you how. Complete Outfit Free. Nimrod Shirt Co., Dept. 8, 4922-24 Lincoln Ave., Chicago.

REAL Selling Sensation! Tremendous earnings whole or part time! Patented Hot Water Bottle Combination Invention needed everywhere. Big commissions. Extra bonus. We deliver. Write C1014, Lobl Corp., Middleboro, Mass.

SURE Seller to every merchant—no gamble—big profits—steady repeater—free sample and exclusive territory. Embossed Show Card Co., 9464 Euclid, Cleveland, Ohio.

MIRRORS Resilvered at Home. Costs Less 5 cents per square foot; you charge 75 cents. Immense profits, plating like new; brassy worn-off autoparts, reflectors, tableware, stoves, etc. Outfits furnished. Details Free. Sprinkle, Plater, 138, Marion, Ind.

AGENTS: Why not sell Paintographs? Once shown always sold. Beautiful and novel. No competition. Popular Holiday Gifts. Sure repeaters. Our men are cleaning up. You can too. Write for free particulars today. Bradfords, St. Joseph, Mich.

AGENTS, something new. 8 tools in one. Fine leather case. Fits hip pocket. Use it every day. Big seller. Details free. Novelty Cutlery Co., Chest 231, Canton, Ohio.

AGENTS, Mail Dealers, Demonstrators, Dollar bottle perfume, and dollar book both 25c. Cost you 10c. Samples of both and particulars 25c. You won't believe your eyes. Vauty, 155 W. 21st, New York.

FREE Adding Machine to "Live-Wires" accepting our Dollar-a-Minute Agency. Improved 2-lb. Calculator. Adds, Subtracts, Multiplies, Divides. Work equals $300.00 machines. Retails $15.00. Big demand; large profits. Write quick for protected territory. Lightning Calculator Co., Dept. F, Grand Rapids, Mich.

NO Dull Times Selling Food. People must eat. Federal distributors make big money; $3,000 yearly and up. No capital or experience needed; guaranteed sales; unsold goods may be returned. We furnish you with sample case, license and Free Samples for customers—Sure repeat orders. Exclusive territory. Ask now! Federal Pure Food Co., A2307 Archer, Chicago.

SALESMEN—Here's the double income line—1 call, 2 sales. Helix Hosiery, lingerie, guaranteed. Low prices, generous commissions. Write for result producing plan. Helix Co., 213-D Fourth Ave., New York.

NEWEST Craze! Onyx Ring — Interchangeable Monogram or Emblem. Retails $4.50. Your profit $2.25. Demand so big agents needed everywhere for tremendous Christmas business. Also complete line Auto and Wall Emblems. Get free sample—bonus plan. Crafts, Dept. PM12, 3314 Lawrence Ave., Chicago.

WE pay $48 a week, furnish auto and expenses to introduce our Soap and Washing Powder. Buss-Beach Company, Dept. A42, Chippewa Falls, Wis.

GENERAL Agents Wanted to Sell Postcards. No Talking required. Big Profits. Sample and Selling Plan 10c. Herman Studio, 706 Calhoun St., Ft. Wayne, Ind.

OPEN Toilet goods shop anywhere. We furnish everything. Liebig's, Beaver Dam, Wis.

GET posted—Good prices paid for butterflies, insects. See Sinclair display advertisement, page 68.

AGENTS—Best seller; Jem Rubber Repair for tires and tubes;; supersedes vulcanization at a saving of over 800 per cent; put it on cold, it vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Philadelphia, Pa., Dept. 505.

LAST Call! Fall in. Here's a Money Maker! Supreme Shirts give 100% satisfaction. Proposition, Kit Free. Supreme Shirt Co., 276-M Fifth Ave., New York.

SELL men's neckwear; wonderful proposition. Astor, 318-M Broadway, New York.

OUR latest neckwear and lingerie line is unequalled for making money. Write for details. Public Service Mills, 725-F Slip St., Union City, N. J.

BIG earnings. Square Deal Policy, sell "Spires Quality Shoes" direct to ladies. Big values, snappy styles, $4.00 up. Money Back Guarantee. Protected Territory. Write! Spires Shoe Company, Dept. 420, Cincinnati.

PEARLS Make Ideal Christmas Gifts; Every Woman Customer; Write Hanover Trading, 925-F Broadway, New York.

MAKE—Sell Your Own Goods. Formulas by experts. Manufacturing Processes. Trade-Secrets. All kinds. All lines. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

WE Pay $50 a Week and Expenses and give Ford Auto to men to introduce poultry and stock compounds. Imperial Co., D-23, Parsons, Kans.

AGENTS—Clean up on Eyeglass Cleaner. Carried in vest pocket. Sells itself. Steady repeater. Sample 25c, refunded first order. Philip Amendt, 441 Maple Ave., Phillipsburg, N. J.

75c PROFIT on $1.00 Sale. Auto, Furniture and Glass Cleaner. Your Name on Label. Exclusive Rights. Free Sample. Mfg-E, 213 Griswold, Detroit, Mich.

FREE: Large Wholesale Specialty Catalog, showing latest best sellers from all parts of the world. Spors Co., Lesueur Center, Minn.

GET Pay Every Day; Distribute nationally known Food Products to established users. Now is the best time to make permanent connection bringing $2,000 to $5,000 a year. Write the J. R. Watkins Company, Box 27, Winona, Minn.

PORTRAITS, photo-pillow tops, frames, sheet pictures, medallions, merchants' signs, food products, photo jewelry, guaranteed hose, toilet requisites, luminous crucifixes. Catalog 50 specialties free. 30 days' credit. Jas. C. Bailey Co., Dept. C12, Chicago.

STARTLING Selling Plan! $1.25 premium free to every customer on $2.00 sale of 8 ounce Vanilla, 6 ounce Shampoo and 4 ounce Lemon Lotion. Details and samples free. C. I. Togstad, Dept. 18T, 29 S. Clinton, Chicago Ill.

$50,000. PICTURE Man Friedman made canvassing. Beginners can make $100.00 weekly with my sales talk. Experienced men make more. Free book. "Profits in Portraits" explains. Samples Free. Picture Man Friedman, Dept. 8B, 541 W. Lake, Chicago.

AGENTS—Mesco Corn and Callous Remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Co., 307 Searle Bldg., Rochester, N. Y.

STARTLING Invention. New Shock Absorber for Fords retails at $3.00. Big profits easy. Exclusive distributors wanted. M & M Mfg. Co., 21 Station C, Omaha, Nebr.

AGENTS—Make a dollar an hour. Sell new kind of sharpeners. Sharpens all knives and tools quickly. Demonstrating sample free. Premier Mfg. Company, Dept. 62, Detroit, Mich.

100 MORE active men to introduce Chieftain Guaranteed Tailored Shirts (3 for $4.95). Latest novelties, colors. Dickman, Illinois, in 3 weeks made $589; Sinton, Texas, in 12 days, $219.60; Bend, Iowa, in 16 days, $334.80. Why not you? No experience or capital needed. We deliver and collect. Full working outfit Free. Cincinnati Shirt Company, Secy. 15816, Cincinnati, Ohio.

START a manufacturing business of your own. Earn $100 weekly. Make your own products. Formulas, toilet articles, perfumes, soap, extracts, etc. We furnish everything and show you how. Valuable catalog free. National Scientific Laboratories, 1904W Broad, Richmond, Va.

MANUFACTURE Very Latest, Biggest-selling Advertised Specialties yourself—No Machinery; investment small—All lines. Stamp brings Valuable Interesting Literature explaining how others sell your products and big bunch lists Guaranteed Formulas. 300 to 1,200% profit to you. Reliable Information Only. No "Master Formula" trash. Miller, Chemist, 1706-V Jetton, Tampa, Fla.

"AGENTS." Big Money Selling New Household Cleaning Set. Washes and dries windows. Sweeps, scrubs, mops. All complete only $2.95. Over half profit. Write Harper Brush Works, 132 Third St., Fairfield, Iowa.

65 MILES on 1 Gallon—Wonderful Gas Saver. All autos. 1 free. Critchlow, 805-V, Wheaton, Ill.

AUTO owner tire agent wanted each locality to use and take orders for hand-made Mellinger cord and balloon tires; guarantee bond 15,000 miles; shipped prepaid on approval; get your tires free; no capital or experience required; make $100 to $300 weekly. Write for wholesale prices and sample kit. Address Mellinger Tire Co., Dept. 400, Kansas City, Mo., or Dept. 400, Philadelphia, Pa., or Dept. 400, Oakland, Calif.

AGENTS $1 Retails $3. Your Profit $2. Wonderful pocket Adding Machine with Magic Writing Pad. Particulars Free. Typewriter Supply, 905 Hersh Bldg., Pittsburgh, Pa.

ONLY 1 Sale Daily Means $135 per Month Profit! Full or spare time. New $5,000 Accident and Sickness Policy, $25 Weekly Benefit, Premium $10 yearly. Tremendous demand—amazing profits. $100,000 guaranteed with State. Write quick for territory and special contract. Underwriters, Dept. 702, Bonnell Bldg., Newark, N. J.

AGENTS—N-R-G Laundry Tablets, the old reliable moneymaker for live agents. Millions sold—200% profit—sales waiting for you. Clothes washed spotlessly clean in 10 minutes without rubbing. Free samples. N-R-G Company, 230 W. Superior, Chicago.

CALIFORNIA Rosebeads selling like hot cakes. Agents coining money; new stuff. Big profits. Catalog free. Mission Factory PM, 2328 West Pico, Los Angeles, Calif.

MAKE $75 to $100 Every Week. Just taking orders for the Longwear line of men's and women's guaranteed all leather shoes at factory prices. Selling like wildfire. Write for samples. Longwear Shoe Company, Dept. F, Minneapolis, Minn.

FREE Ties or a Beautiful 31 Piece Monogrammed Dinner Set, or both, with each order for full box of our Guaranteed Hosiery; Ladies All Silk Hosiery 25c; over 35 Hosiery and Neckwear Styles; from 37% to 117% commission, 10% Bonus; over 50 colors. State experience and give three references to see Samples. We deliver. S. Q. S., Desk H, Lexington, Ky.

A BUSINESS of Your Own — Making Sparkling Glass Name and Number Plates, Checkerboards, Signs. Big Book and Sample Free. E. Palmer, 512 Wooster, Ohio.

AGENTS—New Plan, makes it easy to earn $50.00 to $100.00 weekly, selling shirts direct to wearer. No capital or experience needed. Represent a real manufacturer. Write now for Free Samples. Madison Company, 566 Broadway, New York.

GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

DO you want good live agents—fellows who can get the business? Ask me how others are doing it. I'll gladly render the necessary assistance without cost to you. Address, M. L. Rund, Mgr. Classified Advertising, Popular Mechanics Magazine, Chicago.

AGENTS wanted — To sell Ray-O-Lite cigar and gas lighters. Big earnings. Sample 50c. Rapid Mfg. Co., 799-E Broadway, New York.

OVER 100% Profit. Self Lighting Gas and Cigar Lighters; Everybody interested, repeat business. Sell individuals, dealers, subagents. Particulars Free. P. Bernhardt, 127 West 30th St., New York.

MILLIONS stolen. Remarkable new $5.00 Check Protector stops forgery. Inks, protects two colors. Sensational sales, profits. Write. Safety Devices Corp., Grand Rapids, Mich.

AGENTS — Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marui Company, Tribune Bldg., New York, N. Y.

BECOME Your Home Town's Leading Business Man. You can make $100.00 weekly selling our guaranteed food products, paints, oils, shirts, hosiery, etc., direct to consumer in towns and country. Every article a repeater. No experience necessary Exclusive territory for men and women. Loverin & Browne Co., 1615 S. State St., Chicago.

DISTRIBUTORS, Salesmen, Energetic Men wanted every city to job Easy-Mend; new household product, thru agents and stores; can earn $3,500 — $5,000 yearly; whirlwind seller; repeats 8 to 20 times yearly; successful campaign, sales talks, circulars free; few dollars capital starts you. Facts sent free. Thos. Barnett, Pres., 1811-B Mondamin, Des Moines, Iowa.

REMNANT Store, Bethel, Ohio. Greatest Dry Goods Bargains on Earth. Agents and Dealers.

WILLIAMS' No-Water Hand Soap, in tubes, has taken Auto owners by storm; washes dirtiest hands perfectly clean without water; easy demonstration makes quick sale. 150% profit. Williams Co., Dept. 265 Montclair, N. J.

PRIVATE Brand Toilet Articles, Food Products. Household Specialties. We pack these goods for you under your private label. With your name on goods you get all the repeat business. Appoint sub-agents to work with you. Highest Quality Merchandise. Over 200% profit. Write immediately for our attractive offer. Supply Department, National Scientific Laboratories, 1904W Broad, Richmond, Va.

$320 PROFIT First Three Days' Sales for Zindel, Illinois, with Morey Quick Action Auto Rim Tool. Profit $2 tool. Exclusive territory for hustling agents. Earn $10 to $50 cash daily, $75 to $300 weekly year round. M. Morey Rim Tool, Bilsfield, Mich.

SELF Threading Needles find sales in every home. Fine side line; big profits; easily carried. Sample free. Prentice-Lee, 145 East 23rd St., New York.

$60-$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

AGENTS Wanted. Pocket Puzzles—200% Profit, Sample and Catalog Free to Agents. Western Puzzle Works, Saint Paul, Minn.

WANTED: Local and State Representatives for famous ready made Artistic Signs, price tickets, etc. No competition. Full protection. Large profits. For particulars write Artistic Signs, 799R Broadway, New York.

BIG Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge $1.50; make $1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

AGENTS: 500% profit. "Happy Home Make Shampoo" builds your own big business. Martin of Indiana made $75.00 in one day. Missouri man made $750.00 one month. Exclusive territory. Geo. A. Schmidt & Co., Dept. P, 236 W. North Ave., Chicago.

NEW $3.50 Automatic Adder. Fast seller —Big Profits. Exclusive territory for live-wire sellers. Bassett Company, 1458-C Hollywood Ave., Chicago.

AGENTS — Sell Pure Linen Imported luncheon sets; big commission in advance. We deliver; a great new money maker for men or women agents. Belfast Linen Co., G431 S. Dearborn, Chicago.

"AMAZING New Cleaner." Cleans Everything. Sells like wildfire. Quick Repeater. 300% Profit. Miller, New York, made $1,000 in 6 weeks. Beck, Illinois, $98.00 in 2 days. Premium sales plan and Free Samples make selling easy. Work full or spare time. Write quick. Bestever Products Co., 1945E, Irving Park, Chicago.

PERFUMED Beads from California. Fast Sellers. No Competition. License unnecessary. Big margin. Hire subs. Clean up. Mission, 519PM, 2328w. Pico, Los Angeles, Calif.

MOCCASIN Manufacturer Wants Agents Everywhere to sell a complete line of moccasins to wearers. Entire new line. No competition, repeat orders. Get details. Daley Moccasin Co., Fort Covington, N. Y.

$16 A DAY Easy—I start you in auto accessory business; no investment; no experience necessary. Landin, 3433 Montrose Ave., Chicago.

CAN you sell Ford size tires at $3.50 each? Write for plan. Details free. American Accessories Co., Station 231, Cincinnati, Ohio.

START a manufacturing business of your own. Earn $100 weekly. Make your own products. Formulas, toilet articles, perfumes, soap, extracts, etc. We furnish everything and show you how. Valuable catalog free. National Scientific Laboratories, 1934W Broad, Richmond, Va.

WE Start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept. 2480, St. Louis.

65 MILES on 1 Gallon—Wonderful Gas Saver. All autos. 1 free. Critchlow, 805-M, Wheaton, Ill.

AGENTS—Make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404, Amsterdam, N. Y.

GOLD Leaf Window Letters and Script Signs. No experience; 500% profit. Samples free. Consolidated, 69U—West Van Buren, Chicago.

AGENTS—Send for Free Sample "Fretnot" Washday Wonder. Big Profit. You don't have to talk; if she doesn't buy at sight, leave sample. Exclusive territory. Credit given. Empire Specialties Co., 1549 N. Wells, Dept. 101, Chicago.

AGENTS make $100 week placing advertising Cigar Lighters with glass front. Every dealer wants one. Write for free plan. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

AGENTS—Sell 5c fast selling candy specialties to stores. Big profits. Lorrac Products Co., Albany, N. Y.

MANUFACTURER lamb wool polishers, dusters. Newhall, 358 Broad St., Lynn, Mass.

SELL by mail! Big Profits! Books, Formulas, Novelties, Bargains. Particulars Free. Elfco, 523 South Dearborn Street, Chicago.

AGENTS make $3.00 an hour taking orders for our 40 Fascinating Kitchen Specialties. No competition. Write Quick. General Products Co., Dept. 7-K, Newark, N. J.

GIVE Away finest laundry soap Free. You'll make $10 daily easy by new selling plan. Big repeat business. Write quick. Wolverine Soap Co., 28 Wolverine Bldg., Grand Rapids, Mich.

AGENTS—Steady income. Large manufacturer of handkerchiefs and dress goods, etc., wishes representative in each locality. Factory to consumer. Big profits, honest goods. Credit given. Send for particulars. Freeport Mfg. Co., 59 Main St., Brooklyn, N. Y.

POLMET—The Wonderful Polishing Cloth that cleans all metals without liquid, paste or powder. Approved by "Good Housekeeping" and "Modern Priscilla"—sells fast at 25c. Sample free. Gale & Co., Inc., 15 Edinboro St., Boston.

AGENTS — Stamping names on Pocket Key Protectors; sample Check with your name and address, 25c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

BIG Money Monogramming automobiles. $1.40 profit on $1.50 sale. Particulars and samples free. Evans Products Company Midian Avenue, Windsor, Conn.

AGENTS—Here's a New One. "Best-ever Powdered Hand Soap." Sells like wildfire. Marvelous Discovery. Removes grease, paint, ink, oil, in fact anything from the hands. Cannot harm skin. 150% Profit. Great Repeater. Agents simply coining money. "Free Samples Get the Business." Write immediately. Bestever Products Co., 1937 E. Irving Park, Chicago.

NEW Wonderful Seller, $1.40 profit on every $1.50 sale, monogramming autos; free samples. Monogram Co., B99, Worcester, Mass.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

INSTANT Weld. Repairs largest punctures without cement or heat. Lenn's profit one day, $56. Write quick. Free sample; territory going fast. Tourists' Pride Mfg. Co., Desk T, Minneapolis, Minn.

YOU Can Make Good Durable Paint and Varnish 40c per gallon. Write Dept. 2 Emmelmann Bros. Mfg. Co., Indianapolis, Ind.

65 MILES on 1 Gallon—Wonderful Gas Saver. All autos. 1 free. Critchlow, 805-W, Wheaton, Ill.

REPLATE brassy worn-off Automobile parts, Reflectors, Bath Room Fixtures, Worn Spoons, Forks, etc., with pure silver. Looks like new. Use U-Kan-Plate Polish. Positively no mercury. $1.00 half pints. Post Paid. Satisfaction Guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia.

$1 PER hour selling Dirt-Solvo Washing Powder. Big repeater; exclusive territory. Premiums for customers. Sample free. Goodspeed Products Co., Rutland, Vt.

AUTOMOBILE Specialties. Guaranteed formulas for all latest money makers. Lowest prices. Write for free lists. Murphy, Chemist, Tujunga, Calif.

FURNITURE refinishing, polishing, painting, handyman shop; wonderful profits; start yours on nearly nothing. John Braceland, 1457 So. Ninth, Philadelphia, Pa.

McDONALD Polishing Cloth cleans gold, silver, nickel. Sample, terms. 15c silver. Daniel McDonald, 18 Agawam St., Lowell, Mass.

AGENTS, both sexes, we manufacture and control new household article. Fast seller. Big profits. Exclusive territory. Write now. Connolly, 123 Liberty St., New York.

AGENTS: Big Money Monogramming by Transfer method. Catalog Showing Over 50 Styles and Particulars Free. Motorists' Accessories Co., Mansfield, Ohio.

FREE Sample. "Rain Shield Wiper," Retails $1.00—Cost (25 cents). Sold Clear and Rainy Days. No Cloth—No Paste—No Attachment. (1) Rub keeps windshield clear 48 hours. Experience Unnecessary. NuLife Corporation, Hartford, Conn.

EARN $10 daily silvering mirrors, plating and refinishing metalware, autos, chandeliers, bedsteads, headlights. Outfits furnished. E. Decie Laboratories, 1133 Broadway, New York.

ALL-YEAR-ROUND profitable business selling wonderful new water softener and cleaner. Removes grease, oil, ink and dirt quickly. Every home and business place a live prospect. 100% profit. Big repeat orders. Exclusive territory. Write for free sample. Seacoast Laboratories, Sea Bright, N. J.

PENNANTS and Pillows: Colleges, Schools, Clubs, Lodges. Students and agents get busy. American Pennant Co., 66 Hanover St., Boston, Mass.

KLEENZIT Kleening Pencil—New, different, instant appeal to housewives and tailors. Sell like hot cakes. Removes spots from clothes without leaving marks or rings. 50c seller—big profit. Agent's sample 25c. Write quick. Exclusive territory. Argyle Specialty Co., Dept. P, Argyle, Wis.

AGENTS: Our gold-eyed Needle Cases are wonderful sellers; immense profits; $50 to $300 weekly; proof and particulars free; sample outfit 15c; factory prices. Paty Needle Co., 231 Davis Square, Somerville, Mass.

HIGH-GRADE SALESMEN WANTED

WANTED—Tailoring Salesmen, make $60 to $125 per week. Biggest merchants in many towns have started with our line. We are the largest made-to-measure tailoring house in the country, furnishing elaborate sample equipment, including 500 all-wool fabrics. You make your own profits from $8.00 to $15.00 on each order. Guaranteed absolute satisfaction, perfect fit, best workmanship, or no sale. Write for our line and all accessories to be sent free. Tell us all about yourself. Address N. O. Perry, Sales Manager, Box 483, Chicago, Ill.

SALESMEN—Become Independent. Own Your business, experience unnecessary selling our $7,500.00 Accidental Death; $50 Accident; $25 Sick Weekly Benefits—$12.50 Yearly. Other Amounts proportionate. Guaranteed steady Income from renewals. $250,000 Deposited Insurance Department. Universal Policy, Dept. A, 30 Clinton St., Newark, N. J.

MAGIC Moving Window Salesman. It's Real changeable letter system has actually boosted users' sales 200% to 400%. None but dead dealers indifferent. If you can spot a winner, get the facts and begin pocketing $100 weekly. Display Products Company, P. O. Box A5123, Gateway Station, Kansas City, Mo.

SALESMAN: Manufacturer of established line guaranteed tools offers profitable connection to men with mechanical and some sales ability; part time men considered; two average sales daily net $50.00 weekly; advance commission. Write for free catalogue and money making plan. J. G. Woods, Inc., 37 West 20th St., New York, N. Y.

MAKE $100 Weekly in spare time. Sell what the public wants—long distance radio receiving sets. Two sales weekly pays $100 profit. No big investment, no canvassing. Sharpe of Colorado made $955 in one month. Representatives wanted at once. This plan is sweeping the country—write today before your county is gone. Ozarka, Inc., 431 N. LaSalle Ave., M, Chicago.

START a manufacturing business of your own. Earn $100 weekly. Make your own products. Formulas, toilet articles, perfumes, soap, extracts, etc. We furnish everything and show you how. Valuable catalog free. National Scientific Laboratories, 1934W Broad, Richmond, Va.

SALESMEN — Sideline — Pick up big commissions selling plain and advertising Toy Balloons for World's Largest Balloon Factory. Pioneer Rubber Company, Willard, Ohio.

SALESMEN, go into the office accessory and supply business. We furnish complete lineup. Build a permanent business that pays big money. Write for particulars. Davis Company, 10 Tremont, Boston, Mass.

SALESMEN—New line, New Field, $6.50 profit every sale; sell Radium health products. A scientific, drugless treatment needed in every home. The $2,500,000,000 spent yearly for health assures you a permanent and profitable business with no dull seasons; experience unnecessary. Exclusive territory. Write Radiumized Applicator Co., 1303-P Fillmore, Buffalo, N. Y.

SALESMEN—Tremendous Repeater. Used by Millions. $20 profit on ten $3.50 sales. Merchant's repeat orders build permanent business. Auto Bonus. Territory. Full or Side Line. Hustlers wanted only. Elcar Products, Dept. L-10, Washington, D. C.

COLLECTS Money from the Dead-Beats. Retails $5.00—Cost $1.00—Profit $4.00. "New Method." Every Storekeeper, Doctor buys quickly. Wonderful Money Getter. Federal Association, Hartford, Conn.

GREAT neckwear line now free! Features finest quality neckwear at factory prices. Collect big commissions daily. Write for Free tie offer and Free outfit. Nawco Neckwear, Desk 12-B, Covington, Ky.

MR. BRUSH Salesmen—Old Established New York Brush Manufacturers require services of men in all territories to sell their extensive line of Sanitary Twisted in Wire Brushes. We pay larger commission than any other Brush House in the country. Write immediately for proposition. Wire Grip Sanitary Brush Corporation, 15 Mercer Street, New York.

SALESMAN—Trunks, bags and suitcases sell everywhere. Excellent sideline; commission basis. Write us today for proposition. Appomattox Trunk & Bag Co., Petersburg, Va.

BIG profits! Permanent trade! Gift Day everyday! Liberal free goods, bonus awards, selling quality toiletries of distinction. LeMaire Perfume Co., 3330 Carroll Ave., Chicago. Dept. 609.

MAKE money selling advertising novelties and calendars. Select line of quick sellers. Fine sideline. Write today. William Miller Son Co., Charlestown, N. H.

SALES manager to distribute faultless automatic sash holders. Salary $5,000 a year and bonus. Address Faultless Sash Holder Co., Inc., Indianapolis, Ind.

LITTLE Wonder Pencilknife, safetyclip, nailcleaner, fits on pencil. Samples 10c. Klees Company, 1710 Undercliff Avenue, New York.

LITTLE Wonder Pencilnife, Clip, Eraser, Cigarcutter, Nailcleaner, Letteropener, made of finest Sheffield steel, fits on pencil. Sample and catalog of 20 best agents' specialties for 10c. Klees Co., 1710 Undercliff Ave., New York.

SIDELINE men calling on retail cigar stores, billiard halls, confectioners, drug stores. Compact samples. Big commissions. Harlich Mfg. Co., 1413-A W. Jackson Blvd., Chicago.

SALESMEN: Want $6,000 this year? Write us today. Strong retail line, nationally advertised. Company established 26 years. Liberal advances to producer. Continental Co., 1300 Liberty Bldg., Cleveland, Ohio.

START a manufacturing business of your own. Earn 100 weekly. Make your own products. Formulas, toilet articles, perfumes, soap, extracts, etc. We furnish everything and show you how. Valuable catalog free. National Scientific Laboratories, 1934W Broad, Richmond, Va.

BECOME Your Home Town's Leading Business Man. You can make $100.00 weekly selling our guaranteed food products, paints, oils, shirts, hosiery, etc., direct to consumer in towns and country. Every article a repeater. No experience necessary. Exclusive territory for men and women. Lowrin & Browne Co., 1600 S. State St., Chicago.

$100—$200 WEEKLY. Retailers' live-wire specialty. $40 weekly guaranteed against com. Reliable house. Guarantee dealers turnover or money back. Pay you to investigate. Appleton Specialty Co., Cedar Rapids, Iowa.

TAKE orders for coffee, sugar, flour, meats, canned goods, staple groceries also paints, radio sets, tires, auto and tractor oils. No capital or bond required. We deliver and collect. Permanent business. Big pay. Write at once. Hitchcock-Hill Co., Dept. 50, Chicago.

$60-$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-A North Clark, Chicago.

CALIFORNIA Rosebuds selling like hot cakes. Agents coining money. Absolutely new. Big profits. Catalog free. Mission Factory SP, 2328 West Pico, Los Angeles, Calif.

CALENDAR salesmen: Our line is the only one that covers entire field. Calendars—Fans—Signs—Pencils—Blotters—Aluminum—Wood—Celluloid. Remembrance advertising for every merchant. Full or part time. Dept. 226, Model Calendar Co., South Bend, Ind.

ANY Salesmen Can Sell Them! Merchants everywhere use punchboards. Someone sells them, why not you? Collect big commissions daily. Newest, largest, elaborate catalog sent upon request. Lincoln Sales Co., 9 So. Clinton, Chicago, Dept. D.

FOUR $7.50 sales to merchants net you $26.00 daily. Sayers Systems, 2803 Sheffield Ave., Chicago, Ill.

NEW patented fire-prevention device. 40,000,000 users. Now ready to be marketed through country distributors only. Low price. Easily sold. Very profitable. Samples on approval. Reitz Manufacturing Co., Box 271, Shamokin, Pa.

UNUSUAL Proposition—350% to 500% profit for you. World's Best Furniture and Automobile Polish supplied in bulk. Bottles at wholesale—labels Free! Exclusive territory. Write! Hyde Co., Rowan, Iowa.

HELP WANTED

WORK for Uncle Sam. Get Government Jobs. Men—women, 18 up. Commence $95 to $158 month. Steady work. Short hours. Paid vacation. Pull unnecessary. Common education sufficient. Candidates coached without leaving home. Full particulars and 32 page book—Free. Write immediately. Today sure. Franklin Institute, Dept. D3, Rochester, N. Y.

MEN to train for locomotive firemen on railroads nearest their homes—everywhere; beginners $150—$250 monthly; promoted, locomotive engineer, $3,000—$4,000 yearly. Best paying positions on railroads. Railway Association, Desk M1, Brooklyn, N. Y.

MEN, 18 up, wanting to qualify for U. S. Mail Service positions, $142 to $225 monthly, write immediately for free particulars. P. Bradford, 112 Bergen Ave., Jersey City, N. J.

WANTED—Boys and Men, 16 up. $25.00 to $60.00 week. Many positions. Become Automobile Repairman. Work interesting. Easily learned. Sample lessons — Free. Write today sure. Franklin Institute, Dept. D400, Rochester, N. Y.

WE can use 25 men at once. Salary while learning Rubber Tile Floorlaying. This is your chance to learn a big pay job. Big demand for mechanics right now. Easy to learn. Write for information. Wm. Youde, Manager, 4341 W. Harrison St., Chicago.

GET posted—good prices paid for butterflies, insects. See Sinclair display advertisement, page 68.

50 MEN age 18 to 30. Steady work days; able to train 3 hours a night at trade. Ambitious to learn. Good wages. Send application American Building Trades, Hearst Square, Chicago.

RAILWAY Mail Clerks. Men 18-35. $158-$225 Month. Travel—See Country. Common education sufficient. 25 coached free. Write immediately. Franklin Institute, Dept. D16, Rochester, New York.

MEN wanting to prepare for forest ranger or railway mail clerk examinations Write Mokane, A-23, Denver, Colo.

DR. KNOLL'S mystery secrets now revealed. Your radio active life currents can create amazing results quickly. Get these secrets now. Copy $1.00, satisfaction guaranteed. Dr. Wm. F. Knoll, 20 No. Ashland Blvd., Chicago.

FIREMEN, Brakemen, Baggagemen, (white or colored), sleeping car, train porters (colored), $150—$250 monthly. Experience unnecessary. 810 Railway Bureau, East St. Louis, Ill.

RAILWAY Mail Clerks. $158 Month. 25 coached free. Write immediately. Franklin Institute, Dept. D16, Rochester, N. Y.

MEN, 18-45. Become regular Mail Carriers. $1,700—$2,100 year. Sample coaching Free. Write immediately. Franklin Institute, Dept. D16, Rochester, N. Y.

EARN $10 daily silvering mirrors, plating and refinishing metalware, auto, chandeliers, bedsteads, headlights. Outfits furnished. E. Decie Laboratories, 1133 Broadway, New York.

MEN Wanted—prepare as firemen, brakemen, colored train or sleeping car porters, wire for application blank; experience unnecessary; first class roads, no strike. Name position wanted. Railway Institute, Dept. 35, Indianapolis, Ind.

RAILWAY Mail Clerks. $158 Month. 25 men, 18 up, coached free. Write immediately. Franklin Institute, Dept. D16, Rochester, N. Y.

DON'T prepare for any Civil Service Examination without seeing our catalogue. Free. Columbian Correspondence College, Washington, D. C.

BECOME a Landscape Architect. Uncrowded profession of wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Write for book. American Landscape School, 56-E, Newark, N. Y.

SILVERING Mirrors, French Plate. Easily learned; immense profits. Plans free. Wear Mirror Works, Excelsior Springs, Mo.

ALL men—women wanting Government Positions, $140—$225 monthly, should get our "Exam. Coaching" immediately. Write, Ozment, 101, St. Louis, Mo.

U. S. GOVERNMENT wants men. $1,700—$1,900 and up at start. Railway Mail clerk examination coming. Let our expert (former Government examiner) prepare you for this and also Rural Carrier, Post Office, Customs, Internal Revenue, and other branches. Write today for free booklet. Dept. 8, Patterson Civil Service School, Rochester, N. Y.

WE Start You in Business, furnishing everything. Men and women, opportunity to earn $35 to $100 weekly operating Ragsdale's original "New System Specialty Candy Factories" anywhere; wholesale or retail. Big commercial candy book free. W. Hillyer Ragsdale, Drawer 350, East Orange, N. J.

BUSINESS SERVICE

CAPITAL Seekers: Gathering Funds, Limited edition, Free booklet. Act. Dickinson Co., 29 South LaSalle St., Chicago, Ill.

WHAT have you to manufacture or sell? Have facilities, finances, and selling organization. Automotive accessories preferred. Leo J. Schlitzer, Box 1280, Paterson, N. J.

MAKE 'Em Pay—My system will make them pay their bills. Write for the acid test. Literature free. Burleigh L. Horr, Horr Omelia Block, Rhinelander, Wis.

REPRESENTATION in Washington, D. C. Mail address, information, Anything, Anytime. Service, 223 Victor Bldg.

TYPEWRITERS AND SUPPLIES

TYPEWRITERS, all standard makes, thoroughly re-manufactured by the famous "Young Process" and shipped direct from factory to you on 10 days' trial. Guaranteed 5 years. Easy monthly payments. Write today for free catalog. Young Typewriter Company, Dept. 575C, 654 W. Randolph St., Chicago.

TYPEWRITERS, adding and calculating machines at less than half manufacturer's price. Bargains. Free Guarantee. Ford Company, 45 E. 28th St., New York.

SIMPLEX Typewriters $1—$5. Remingtons $12. Demeo, 114 Ford St., Providence, R. I.

UNDERWOOD Typewriters — only $3.00 down. Easy monthly payments. Low prices at less than manufacturers. 10 days' free trial. Rebuilt, all worn parts replaced. Just like a new machine. 5-year guarantee. Write for a big free catalogue B-151. Shipman-Ward Mfg. Co., 1519 Shipman Bldg., Chicago, Ill.

100 TYPEWRITERS Free. Overstocked. Rent rebuilt Underwood or Remington $3.00 month. If you pay its value in rental, we give machine free. Particulars free. Pittsburgh Typewriter Exchange, 945 Hersch Bldg., Pittsburgh, Pa.

TYPEWRITERS, all standard makes. $10 up. Fully guaranteed. Free trial. Write for complete illustrated lists. Northwestern Typewriter Exchange, 121 N. Francisco Ave., Chicago.

TYPEWRITERS: Wholesale, $15.00 up. Dictaphones. Millerco, 2805 Kellogg, Wichita, Kans.

TYPEWRITERS—all makes; real values; guaranteed. Typewriter Bargain House, Ada, Okla.

HIGH grade Carbon Paper and Typewriter Ribbons at lowest prices. Write for Particulars and price list. Nelson Carbon & Ribbon Co., Elmhurst, Ill.

PRINTING, ENGRAVING AND MULTIGRAPHING

PUBLISH Your Own Magazine or House Organ. Our standardized service at one-fifth ordinary prices. Samples and particulars free. Evans Printing Company, Grand Rapids, Mich.

250 WATERMARKED letter heads, (8½ x11), envelopes, bill heads, cards, $1.25 each; combination $4.50. Pflager Bros., Hackensack, N. J.

BUSINESS and Personal Cards at special prices. Samples for Stamp. Business Card Specialty Shop, P-552, Jackson, Mich.

ACQUAINTANCE—Offer: our superfine, colorprinted letterheads and envelopes, half price—1,000, $2.90; 500 $1.65; 200, 95c. Regular grade, $2.00 thousand. "Tool of Hundred Uses," price everywhere $1.00, given free with first order. The Backlind Co., Detroit Lakes, Minn.

150 BOND letterheads and 150 envelopes printed $1.50. Lehman Sales Company, Box 249, Duluth, Minn.

PRINTING: Letterheads, Envelopes, Cards, Blotters. Sales Letters Written, Revised, Multigraphed. Quality Work, Prices Low. Empire Letter Company, Syracuse, N. Y.

HIGH grade commercial Printing at lowest prices. Samples free. Massanetta Paper Co., Harrisonburg, Va.

250 BOND Letterheads or Envelopes, $1.00. Glenwood Art Press, Govans, Baltimore, Md.

5,000 WATERMARKED Bond Letter Heads $10.00. Other printing reasonable. Samples on request. Harlem Press, 132 W. 26th St., New York.

5,000 LOTS 5½x8½ Circulars, $10.00; Ad. Slips, $5.00; 3½x6 Four-page Folders, $13.75. All Printing Lowest Prices. Elegant Samples Free. Good's Printery, Harrisonburg, Va.

GUMMED Labels, with name, Business and address, 500—30c; 1,000—50c. P. Wetzel, Valhalla, N. Y.

"NEARGRAVUREMBOSO" — (type embossed) 250 Letterheads $3.85 postpaid. Samples. Solldays, Knox, Ind.

$3.00 DELIVERED, 500 Watermarked Bond Letterheads, 8½x11, and 250 envelopes, money with order. Job Printing Specialty. National Printing Company, Goshen, Ind.

500 MULTIGRAPH Letters with Printed Head $2.35. Samples. Carlsons, 8743 Essex Ave., Chicago.

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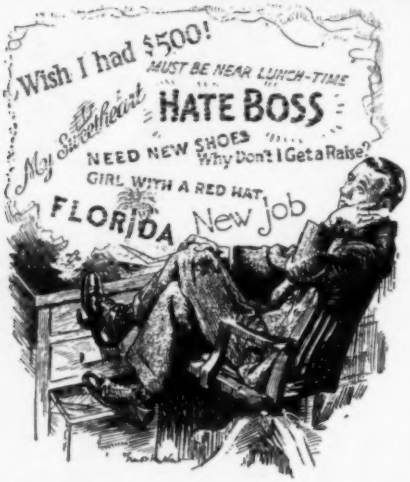
Scatter-brained!

No wonder he never accomplishes anything worthwhile!



HIS mind is a hodge-podge of half-baked ideas. He thinks of a thousand "schemes" to make money quickly—but does nothing about any of them.

Thoughts flash into and out of his brain with the speed of lightning. New ideas rush in pell-mell, crowding out old ones before they have taken form or shape.

He is Scattered-Brained.

He pities himself, excuses himself, sympathizes with himself. And the great tragedy is that he has every quality that leads to success—intelligence, originality, imagination, ambition.

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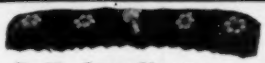

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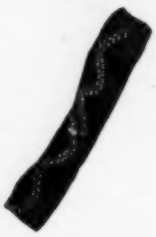

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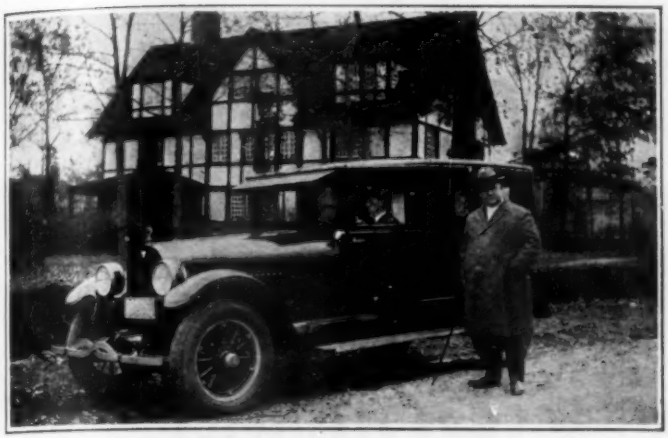

How, after 12 years hard work as railroad brakeman, I got into real estate, and now make more in a month than I used to make in a year.

By L. C. CLARKE
(Address furnished on request)

I Made $4,500 in One Sale

FOR TWELVE YEARS I was a brakeman on the Mohawk Division of the New York Central.

During that time my wages averaged exactly $638.40 a year.

Then I got started in the real estate business, and during the past year I made one sale that gave me a commission of $4,500, which is more than I made on the railroad in *seven years of hard work.*

And I don't feel that I have done anything wonderful—anything the other fellow can't do if he will, I simply got into the right kind of business—a business of big opportunities—a business where big money is made.

You—who are reading these words—can do what I have done if you have a mind to. You don't need education, experience, capital or influence. I didn't have any of these things.

I had to leave school when I was thirteen, so I had mighty little education. I had no real estate experience. I never earned more than just enough to keep me out of the poorhouse, so I had no capital. And, as for influence, where would a $50-a-month brakeman get any?

And you don't have to go to a big town to succeed. I am located in a little New York State town of only 3,000 population.

Of course, I'm pretty enthusiastic about the real estate business. I think it's the greatest business in the world. It has more advantages and bigger opportunities than any other business I know of. It is as permanent as the earth itself. It is almost unlimited in its possibilities—about ten million properties are always on the market. It is easy to learn. You don't need capital to get started, as you do in almost any other business. The business can't grow smaller—it keeps getting bigger and bigger as population increases. And you can get started in the business right at home in your spare time. When I realize that I have an independent, enjoyable business of my own, a good home, two automobiles, and every convenience and comfort a sane man could want, I sometimes find it hard to believe that I'm the same fellow that put in twelve long years of hard work as a railroad brakeman.

Now if you are kicking about what I used to kick about—long hours, hard work and poor pay—if you want to get into a business where you can have the biggest kind of an opportunity to make good—simply send your name and address to American Business Builders, Inc., Dept. 44-Z, 18 East 18 Street, New York, and they will send you, *without cost or obligation*, a copy of their free book, "How to Become a Real Estate Specialist."

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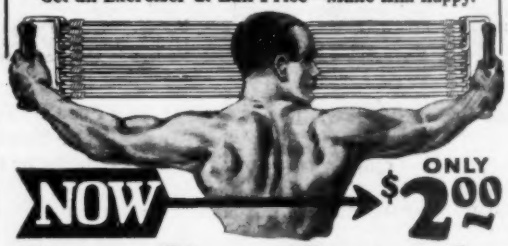

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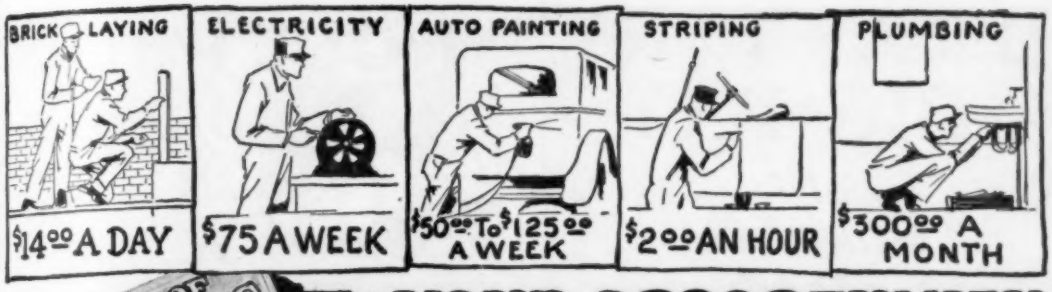

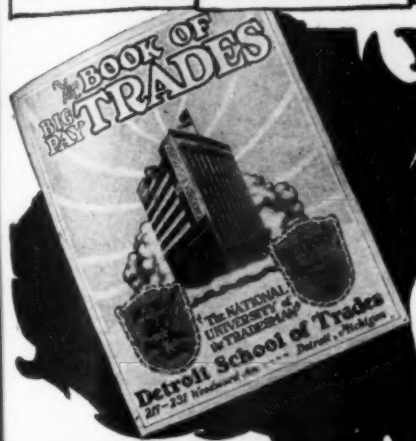

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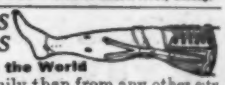

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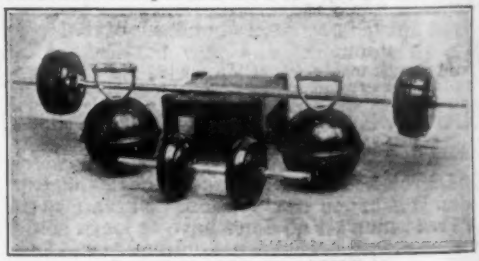

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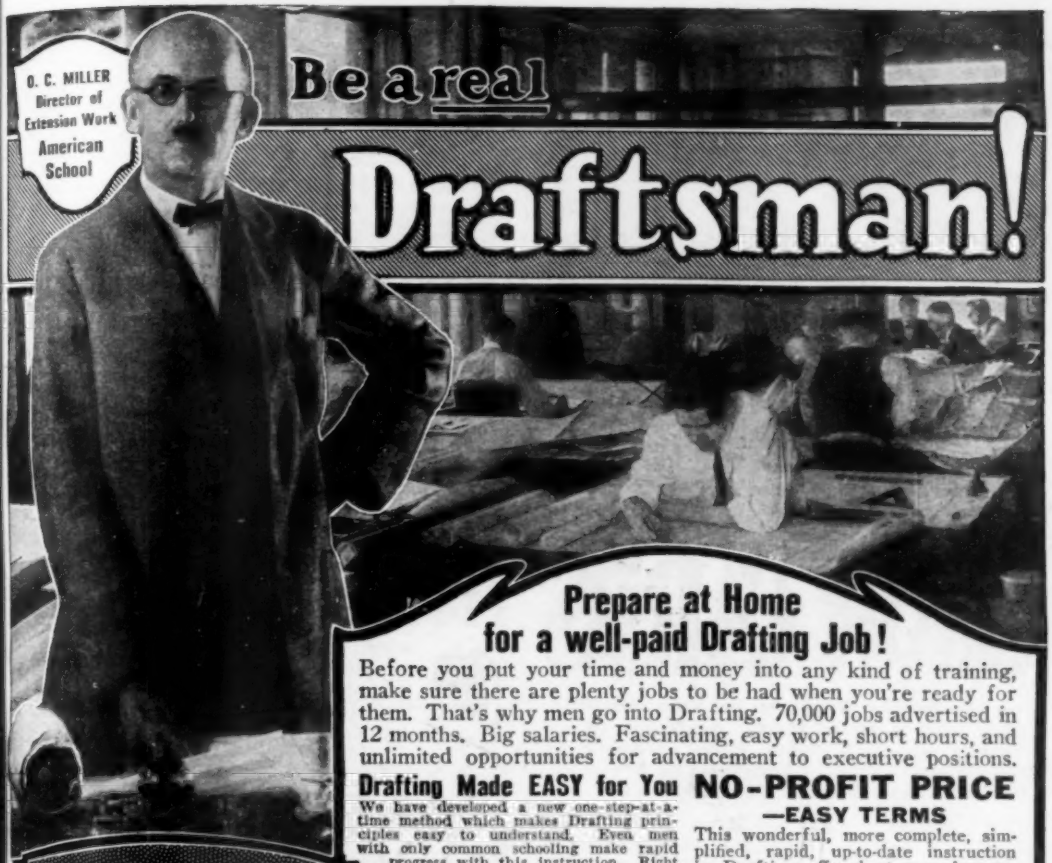

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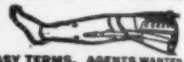

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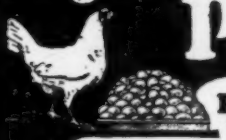

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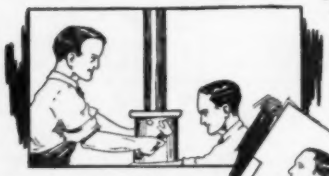

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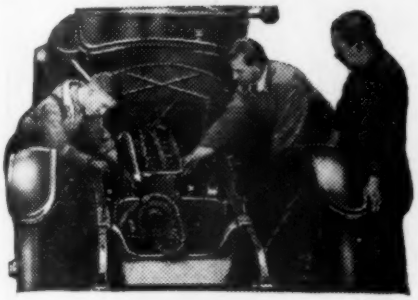

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Select a well-known, long established automotive school with a reputation for efficient training. A school where guarantees mean that when you receive your certificate of ability—you will be able to intelligently repair and properly re-assemble in quick time any standard make of automotive vehicle. New York City is the best place to be trained—because in New York City, Brooklyn, Jersey City, Newark, Hoboken, and scores of other manufacturing and residential cities—within commuting distance, there are more automobiles and trucks—per thousand population—than in any other section of the world.

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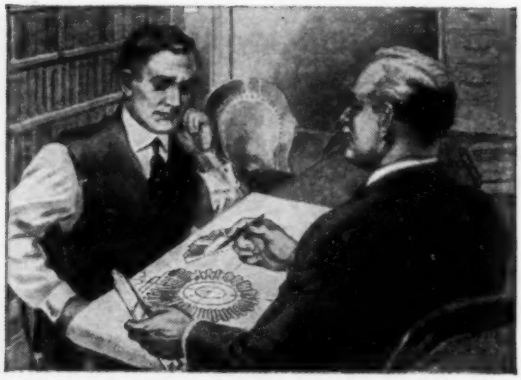

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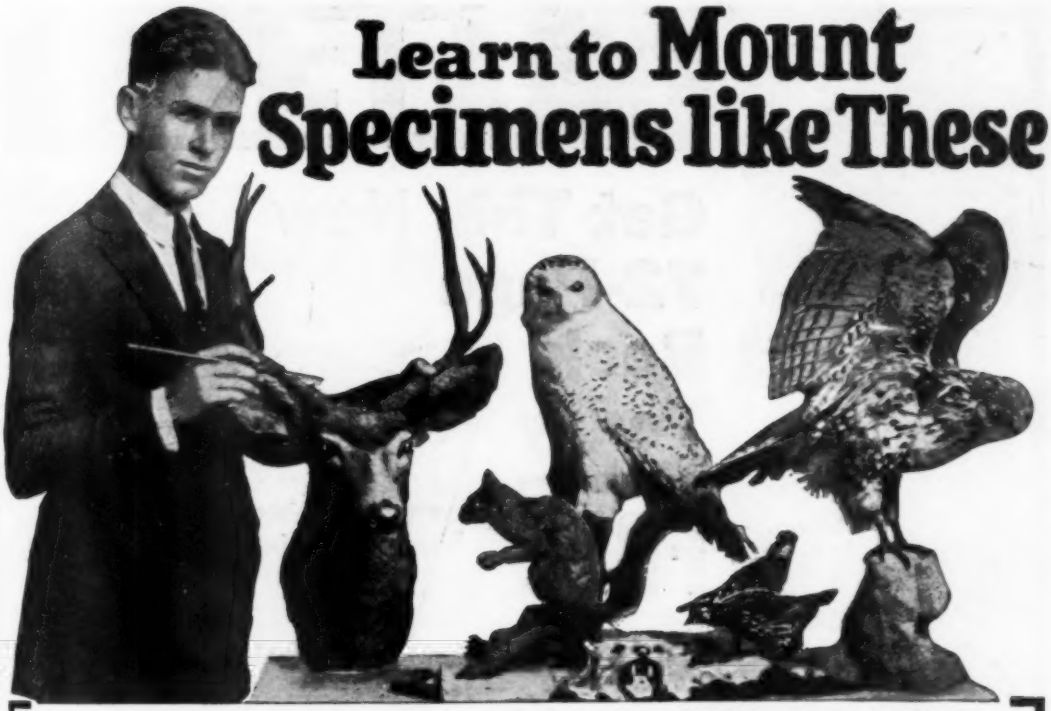

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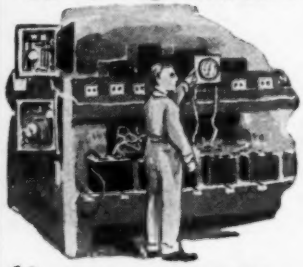

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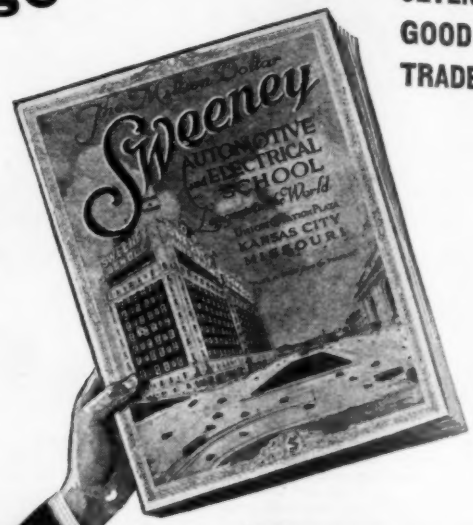

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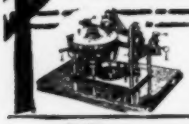

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Please don't beat yourself by thinking of your finances at this time! It isn't money I want now—it's *men*. You, if you mean business. What I am after is your *application*. Once I get that, you'll get *action*. I'll have you ready to draft for important pay—in any engineering or industrial line you like—before you know it. So get my proposition in front of you this week! Then, if you do enroll, you're in line for my free outfit offer.

WELL PAID JOBS are soon sighted by men under Dobe training! They get offers before they're through. Are often spoken for months ahead of graduation. And I have students from 17 years of age to 51 at present time! So: first of all, and right now, send this coupon for my new free book Successful Draftsmanship; fully illustrated; explains everything.

FREE TOOLS COUPON

CHIEF DRAFTSMAN DOBE
1951 Lawrence Ave., Div. 13-59, Chicago

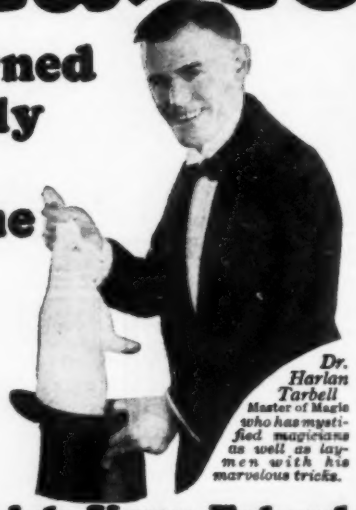
Send me *free* and *postpaid* Successful Draftsmanship Book and material telling all about your home course, terms, etc.

Name..... *Age*.....

Address.....

Magic

Learned Easily At Home



Dr. Harlan Tarbell
Master of Magic
who has mystified magicians as well as laymen with his marvelous tricks.

Astonish Your Friends

Gain that magnetic popularity that makes you the center of any crowd. Business and social success is assured the man who can perform mystifying tricks. You can earn big money either on the side or as a professional, as well as being the most popular person in your crowd. Why envy others' skill? You can learn Magic yourself, quick and easy.

Earn $250 to $1000 a Month

Even sleight-of-hand, generally supposed to require long practice, is NOW made simple to learn. For Dr. Harlan Tarbell, one of the really Great Magicians, has finally opened up the secrets of his profession in a completely illustrated course offered at a merely nominal cost. Through the wonderful Tarbell System you will be able to mystify and entertain your friends with simple tricks taught in your very first lesson. After that Dr. Harlan Tarbell takes you through the entire maze of sleight-of-hand, card tricks and elaborate stage divertisements. The apparently superhuman doings of the accomplished magician become as simple as ABC when you just know how.

Mail Coupon for Special Offer

There is a tremendous demand for magic entertainment. Clubs, Lodges, Charity and Social affairs—all will pay high fees to the man who knows Magic. Dr. Harlan Tarbell really gets as high as $250 for an half hours work right now. Opportunity everywhere to make money aside from your regular occupation. Salesmen find it a tremendous asset. Find out all about this unprecedented opportunity to learn Magic. The coupon brings full details without any obligation. Mail it TODAY.

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Tell me all about Dr. Tarbell's new and simple system by which I can learn the secrets of MAGIC. No obligation on my part.

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Your Choice $20.00 Musical Instruments FREE TO OUR STUDENTS

Your choice of a Violin, Tenor Banjo, Hawaiian Guitar, Banjo, Cornet, Ukulele, Banjo Ukulele, Guitar, Mandolin or Banjo Mandolin. You will be proud to own any one of these instruments and you can have one absolutely **free.** A few cents a day for lessons is your only expense. Our system of teaching is so easy that you can play several pieces by note with the first four lessons. We guarantee success or no charge. Instrument and lessons sent on **one week's free trial.** Write for booklet today, no obligation.

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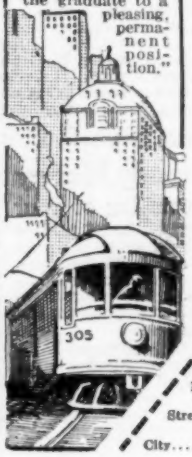
Joseph Suess writes: "Immediately after finishing my course in Traffic Inspection, which took only a few months, I was given employment and helped in every way, never losing a single day's work. The Institute gives a thorough and efficient training and then helps the graduate to a pleasing, permanent position."



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Send me, entirely free, Booklet No. D-304, giving full particulars about course in Railway Traffic Inspection.

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Street.....

City.....State.....

What I would do if I wanted more money—*By J. Matheson Bell*

FIRST of all I'd make up my mind definitely that I was going to get it.

I don't believe any man living can get things worth while without *firmly believing* that he can. Determination will conquer failure anytime, anywhere.

"Busted" and Blue

I'll work harder on my present job to make the boss feel that he owes me more.

But I won't stop there.

I'll put my spare time to work.

I'll quit losing money by making my evenings pay.

I wouldn't give up my present job but I'd make more money by working longer hours.

I'd find something that could be sold evenings, either in my home or some one else's home.

That something would have to be a little out of the ordinary because it would have to be of special interest in the evening.

That would be the time of day when both the man and his wife are at home so I'd find something that would be of interest to both of them.

Decides to Work Harder

I feel sure that such an article would have to be something for the home, something they would both use and enjoy.

So far so good, but what will that something be.

Piano?

Fine, but come to think of it I can't even play one myself so that's out.

Automobile—

Sounds better, guess I could learn how, but seems to me that everybody I know has one. At any rate the auto sounds good—let's see if there is anything better.

Phonograph—

Doesn't sound near so good as the auto.

Vacuum Sweeper—

How Can I Make More?

Not so much interest to the man and I don't see just how I'd show up dust at night.

Radio—

Why, the Sam Hill didn't I think of that before, but let's see if it will do—let's see what its good points are as well as its bad ones.

True—I don't know anything about radio, but I have lots of friends who have learned something about it, so I think I could. What sounds good to me is, that I can demonstrate in the home in the evening, the very time of the day for me, and that's just when all the music is being broadcasted.

I'll have competition. I expect it. I'll have to know just what my demonstration will do that the otherfellow'swont, so lets see what would make the biggest appeal.

Thinks Hard!

Of course, they would be impresed with music from our nearby stations but I feel sure that if I bring in great distances they will be more impressed. It will have to bring in music loud enough so they can sit away back in the room and enjoy it. It must have volume.

They may be satisfied with music from nearby stations, but they'll ask me for distance, so I must be able to get "by" our powerful nearby station. The radio I want must be selective so I can tune out our nearby station if I desire.

I can picture myself in some prospect's home with a radio that will do that, but I wonder if that is enough—maybe my competitor will be there also—maybe he can do all those things as well as I can.

Then where am I?

I've got it—I'll tell you what my radio must do—I want one that my prospect can do all the tuning, so that *he* will get the thrill of bringing in the music from a distance *clear* and *loud* and with a tone that will please.

After all he is the one who is going to operate it, so why wouldn't it be better and best if all he had to do was sell himself. I'll admit I'm not much of a salesman, so if I find a radio that will sell itself then I'll not only whip competition but I'll do it easily.

Gets An Idea—

Best of all, I'll make that extra money I want.

Who knows, I may be so successful at it that I can give up my present job and give it all my time—Gee that sounds too good to be true, but other men have done it so why can't I—I can and I will.

But what radio can I sell that will do what I want and yet sell at a reasonable price—I don't want one so high that my people can't buy—but it must be a good one.

Then when I do sell it, they will want me to fix anything that goes wrong so somebody must teach me how to service radio—that's something I can't afford to overlook.

Where is such a radio?

Where is a manufacturer who will teach me how to sell and how to demonstrate—where I can learn this business, both selling and servicing radio — there must be someone.

Writes to Mr. Bell

There is—Ozarka Incorporated of Chicago—the sign of the long distance goose—they have a 64-page book "The Ozarka Plan" which they will send me if I tell them about myself and mention the name of my county. Where is my pen and some paper? I'm going to make *more money* and I'm going to start *right now* by writing for this book.

10-26

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Pres., OZARKA, Inc.
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Earn $5,000 to $10,000 a year. Get ready in spare time—right in your own home. Previous teaching experience or knowledge of dancing unnecessary. Arthur Murray, America's foremost dancing instructor, will show you how to cash in BIG on the wonderful opportunities now open to teachers in this fascinating, highly profitable profession. He will show you how to open a studio of your own—how to make yourself quickly and favorably known—how to bring pupils flocking to you—how to organize classes—how to train assistant teachers as you require them—how to advertise—in short, everything you need to know in order to establish a permanent, big-paying business in an amazingly short time. Write for details quickly. No obligation. **National Institute of Social Dancing, Dept. T112, 7 East 43rd St., New York City.**

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This wonderful, new scientific discovery is called Aer-Pruf. Steve H. Temple drove a tire that had been punctured 50 times over 3,000 miles and it did not leak a pound of air! An old tire, after being treated with Aer-Pruf, was punctured with 857 nails without a single leak. Another tire was punctured 1,100 times!

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Aer-Pruf seals punctures instantly while you are driving so that you never know you have a puncture. It doubles tire mileage because it prevents driving with partly flat tires—the biggest cause of tire trouble. No injurious effects on casing or tubes. Will last the lifetime of the tube. Applied in a minute. Aer-Pruf does away entirely with changing tires and patching tubes on hot, dusty roads—in blazing sun or in freezing snowstorms.

Absolutely no sales talk is necessary—a deaf and dumb man can sell Aer-Pruf. If you have a car you can equip one of the wheels with an old tube to use for demonstration. But you don't need a car—an old discarded casing and rim will be sufficient to bring in $15 to $25 every day.

AGENTS!
$14 AN HOUR

So startling and marvelously successful is this new invention that salesmen are piling up big liberal commissions for just a few hours' work. J. O. Bright made $29.00 in 2 hours. H. J. Dubois netted $9.00 in five minutes. And Frank Ryman made $57 in a single evening. Every auto owner wants to buy on sight. Ideal for full or spare time—$200 to $400 a month!

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Right now we are making a big special offer to send you FREE Sample Sets of Aer-Pruf and to pay you for the time required to test these samples if you are not amazed and delighted with them. Just send the coupon for full details.

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How often **you've longed to see for yourself** the awe of Egypt's pyramids—the beauties of the gorgeous Mediterranean sunset—the squalor of China's ancient cities!

Spend a few years, or the rest of your life, tasting high adventure on the seven seas and in all the world's great ports—roving the earth's highways and byways! You can do it FREE—all your expenses paid—and earn a good salary besides!

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Radio operators aboard ocean liners live luxuriously—they rank as officers of the ship. Meals, a private cabin, all other living needs are furnished free, and besides the operator draws a good salary. You can learn quickly and easily at home in your spare time to be a Radio operator through our practical training methods. Take a look at the FREE BOOK which tells how—mail coupon below.

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..Thinness	..Rheumatism	..Skin Troubles
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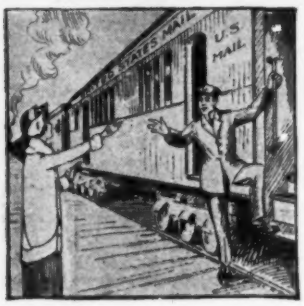

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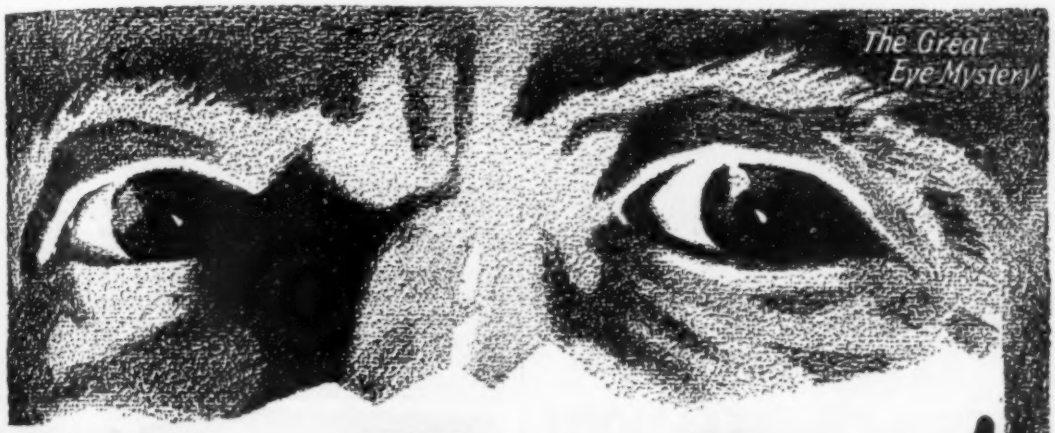

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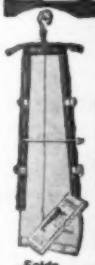
AGENTS



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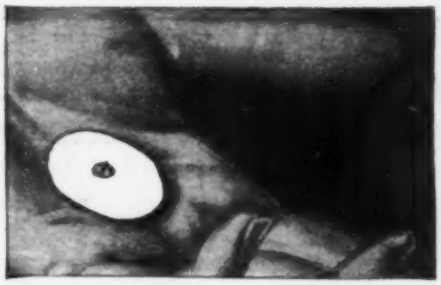
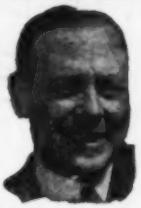


My Rupture Fear Vanished *in 2 Seconds*



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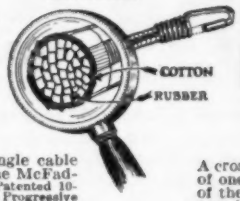

A single cable of the McFadden Patented 10-Cable Progressive Exerciser, no thicker than others in outward appearance — yet stronger by 75 per cent. Inside the thin worsted covering. Here is quality! Every McFadden cable is made of 40 strands of the best grade rubber procurable. There is no padding with extra wrappings of worsted—no attempt to produce the exerciser cheaply.

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No matter how fast your hair is falling out—no matter how much of it is gone—this offer stands.

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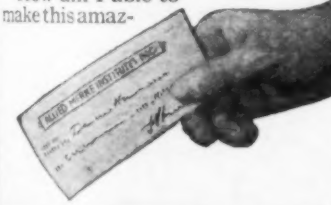
How am I able to make this amazing offer? The answer is simple. My system of hair growth is founded upon a recent scientific discovery. I have found during many years of research and experience in the Merke Institute, Fifth Avenue, New York, that in most cases of baldness the hair roots are NOT dead. They are merely dormant—asleep!

It is an absolute waste of time—a shameful waste of money—to try to penetrate to these dormant roots with ordinary oils, massages and tonics which merely treat the surface skin.



You wouldn't expect to make a tree grow by rubbing growing fluid on the bark—get at the roots. And that is just what my scientific system does. It penetrates below the surface of the scalp. It stimulates the dormant roots. It awakens them. The tiny capillaries begin to pump Nature's own nourishment into them. Hair begins to grow again. It takes on body and color. No artificial hair foods—no rubbing. And here's the wonderful thing about this system. It is simple. You can use it at home—in any home that has electricity—easily—without the slightest discomfort.

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Over One and One-Half Million Autos in California Now —with Over Two Hundred Thousand Tourist Cars Entering State Each Year!

Shortage of Repair Shops Opens Hundreds of Opportunities for Men to Get Into Money-Making Automotive Business

From every state in the Union, thousands of autos are heading toward California! Determined to escape the rigors of Eastern winters, thousands of families are touring Westward to the land of sunshine. Already there are over one and one-half million automobiles registered in California—four out of every five families have a car!

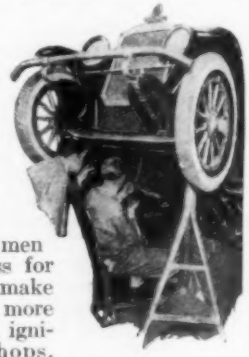
Right now the streets and highways of California are crowded with autos—and new cars are driving into the state by the hundreds every day. The ideal motoring conditions—thousands of miles of paved roads—sunshine almost every day—hundreds of beach and mountain resorts—mean that automobiles in California are used ***more*** than in other states. 365 days of motoring each year—and every car is spending a dollar or more each day for upkeep!

Downtown Los Angeles streets are jammed with autos. Scene shows traffic at Auto Club of S. C. corner. Their records show that an average of 16,425 cars enter California each month from other states!

Big Demand for Auto Men

This unusual condition has created a unique labor shortage in California. Thousands of skilled auto repair men are urgently needed to keep this vast army of motor cars in daily operation. But garage owners everywhere admit that they cannot get the right kind of men. They are forced to hire amateur, inefficient mechanics. Every garage in California is swamped with auto repair work—and employers are issuing a hurry call for "trained men."

Any man who really knows how to repair automobiles will find steady work in California at a salary ranging from $45 to $125 a week. It is easy for skilled men to go into business for themselves and make $10,000 a year or more operating garages, ignition shops, tire shops, battery shops, etc. California cities are growing so fast that there are hundreds of good locations always available.



Over 16,000 men have learned the auto trade in Los Angeles in the shops of the National Automotive School

"America's Busiest Corner"

Over 60,000 cars pass the National Automotive School corner, Figueroa and Santa Barbara Sts., Los Angeles, during daylight hours every day. According to a recent traffic check this is considered by traffic authorities the busiest corner in America

IN CALIFORNIA!

Men Now Training for Jobs That Pay $200 to $600 a Month

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Special day and night classes are being organized every week and inexperienced young and old men from all walks of life—farmhands, high school boys, miners, clerks, etc.—are given personal instruction on all kinds of automotive repairs. Expert instructors teach each student individually how to make all repairs on Packards, Fords, Cadillacs, Buicks and all standard cars. Students get real shop practice performing actual jobs under the watchful eye of an instructor who sees that they learn every job thoroughly.

Become Auto Experts Quickly Earn $6 to $16 a Day

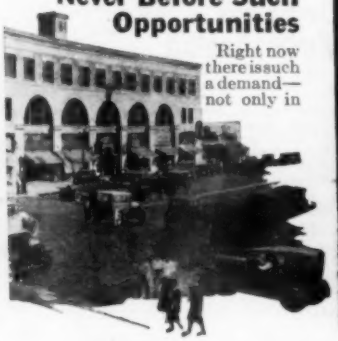
After a few months of this training, the student graduates as a genuine automotive mechanic—experienced in every branch of automotive service. Then the free employment service of the National school introduces him to several employers. The student starts usually at $45 a week—but his superior training and ability soon win promotion and pay increases. Employers recognize that National-trained men know their business—and because of the keen demand for really skilled men, employers are anxious to find such men and pay good salaries to hold them.

Nationally Famous for Quality Training

Over 16,000 men have been trained for success at the National Automotive School in the past quarter-century! This school has won a nation-wide reputation for quality training. Students travel thousands of miles and from foreign countries especially to get the advantage of National training. This million dollar school—with its four acres of shops—is equipped to give complete training. No student is "rushed through" National. The Welfare Department sees that each man gets as much training as he needs to qualify him to meet the requirements.

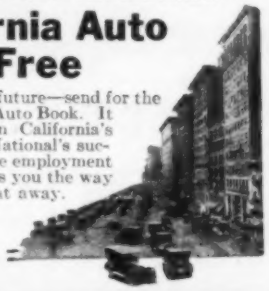
Employers and educational authorities all over the country have endorsed the National system of practical training. Employers recognize that a man learns more in a month at National than he would in a year as a garage apprentice.

Never Before Such Opportunities



Right now there is such a demand—not only in California, but in almost every state—for trained auto experts, that National cannot begin to supply the requests from employers. Never before in the history of the automotive industry have there been so many opportunities for young men to step right into big pay jobs with an assured successful future.

Big California Auto Book Free



Before you decide on your future—send for the 74-page illustrated National Auto Book. It tells you how to cash in on California's motor boom. It describes National's successful training methods—free employment service, etc. This book shows you the way to big pay! Send for it right away. It's free! Address

National Automotive School,
Dept. 665,
4006 Figueroa Street,
Los Angeles, California

LEARN AUTOS IN LOS ANGELES

There is a bigger demand for trained auto men—to service the millions of automobiles in California—than National can supply. Employers are asking us to train men for them. After a short training in National shops you are qualified for a steady job paying $45 to $125 each week. No previous experience necessary.

CALIFORNIA HAS A JOB FOR YOU

You learn more about autos in a month at National than you would learn in a year as a garage apprentice. Why work for small wages for years when a few months at National enables you to step right into the big-pay class. You will probably start at $45 a week and work up to a business of your own in this land of opportunity. National training places you head and shoulders above other men because when you leave National you know ALL about autos!

Expert Instructors Personally Show You How to Make Repairs

FREE EMPLOYMENT SERVICE

You can earn room and board by part time jobs while training. After you complete training National will introduce you to big employers and you can pick the job you want. In this fast-growing state the trained man will always find plenty of work at good pay.

Read about the Opportunities in California in the big 74-page National Auto Catalog. It tells you how you can become a big pay auto expert in California. Sent free—mail coupon.

NATIONAL AUTOMOTIVE AND ELECTRICAL SCHOOL

Established a Quarter Century Ago

Over 16,000 men have learned the auto trade in Los Angeles in the shops of the National Automotive School

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4006 Figueroa St., Los Angeles.
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"YANKEE" Bit Extension is *new!* Bit held by socket. No jaws to break. No loosening and pulling out of bit in work. No trouble to "follow through." And bit in "Yankee" Socket can't jam.

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Lengths: 15, 18, 21, and 24 inches.
Full nickel-plate finish.
Holds large range of bit shanks.
Ask your hardware dealer to show you this new "Yankee" Tool for saving time and labor.

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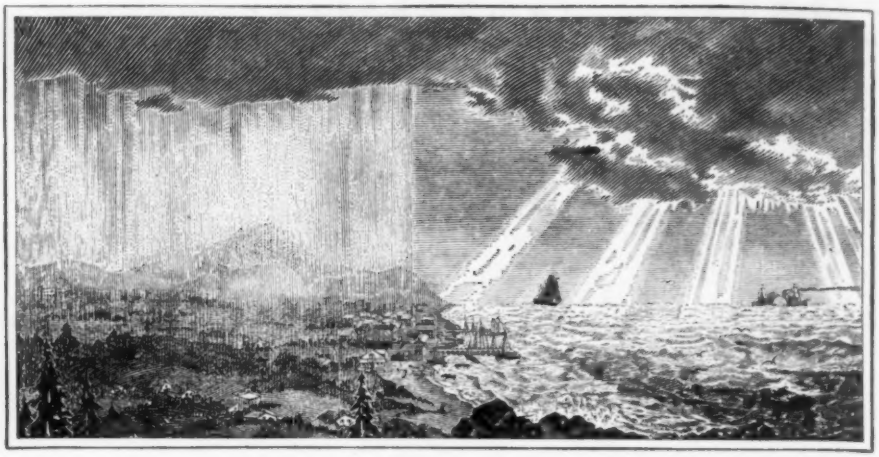

Rain and Telephone Calls

THE annual rain fall in the United States would weigh over three and one-half trillions of tons.

This vast weight is drawn up to the clouds by the unseen but effective power of the sun; representing energy equivalent to 300 billion horse-power.

The annual telephone conversations total over twenty-five billion a year. As silently as sunlight, electricity, mastered by the human mind, carries the voices of the nation.

There must be the man-power of 300,000 individuals to build, maintain and operate the telephone system.

There must be the money-power of over seven hundred million dollars a year to pay for operating the plant, in addition to three billion dollars invested in the plant.

The rain sustains life; the telephone furnishes swift communication for the nation, and they are alike in requiring a vast amount of unseen energy.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
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BELL SYSTEM

IN ITS SEMI-CENTENNIAL YEAR THE BELL SYSTEM LOOKS FORWARD TO CONTINUED PROGRESS IN TELEPHONE COMMUNICATION

Hammer Heads *do* Loosen

But!

You can tighten a PLUMB

Just a turn of the screw makes it tight again

WOOD *will* shrink. You know what happens to your chairs and tables.

It is the same with tool handles. No matter how tightly a new hammer is wedged—when the wood shrinks the handle will loosen and the head will wobble.

Plumb studied this problem for years. And finally solved it.... with a wedge that does this: When a Plumb handle loosens you take a screw driver, turn the screw wedge, — and your hammer is tight again.

That is all you do....just turn the screw and the handle is tight as new.

This remarkable invention does away with loose handles. It gives you a tool that is always balanced, always safe to swing.

All Plumb Tools (and no others) have this patented screw wedge. Good hardware stores everywhere sell Plumb Hammers, Hatchets, Axes and Sledges.

FAYETTE R. PLUMB, Inc., Philadelphia, U. S. A.

It's Free

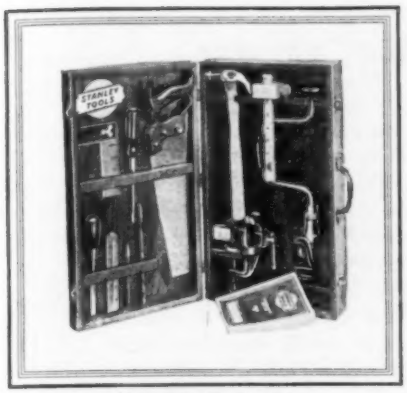
Write for this free booklet telling the story of a remarkable invention that does away with loose handles on tools.

A Christmas tip from the carpenter

LOOK at any fine piece of carpentry work. The finish comes largely from the skill of the carpenter, of course. But there's something else. Look into his kit. You'll see not only an adequate number of tools, but you'll find them all *fine* tools, many carrying the Stanley name.

Right there is a Christmas tip from the carpenter—a chest of Stanley Tools this year for some man or boy! A fine assortment of tools and all good tools—the right set for repair work or the making of such things as book cases, dog houses, and other useful articles. The sturdy oak chest keeps the tools safe and handy. A Stanley Tool Chest is a complete gift.

STANLEY



No. 904 Tool Set

No. 860 Work Bench and Tool Cabinet

Buy separately or in assortments

You will find Stanley Tool sets at a wide range of prices and in a wide variety of assortments—from No. 904 with 12 tools in a fine oak chest at $15, to No. 850 with 49 tools in a beautiful cabinet at $95.

There are also assortments of the same Stanley Tools in cardboard display boxes *with simple directions from which the recipient can make his own chest.* There are several of these "Make Your Own Chest" assortments, at prices from $5 to $20.

There's a Stanley Tool Set to fit every pocket-book!

Ask your hardware dealer to show you the line of Stanley Tools. And send for our Catalogue No. 34-D which describes Stanley Tools both separately and in assortments. Address: The Stanley Works, New Britain, Conn.

No. 907 Tool Set

No. 902 Tool Set

The best tools are the cheapest to use
Ask your hardware dealer

TOOLS

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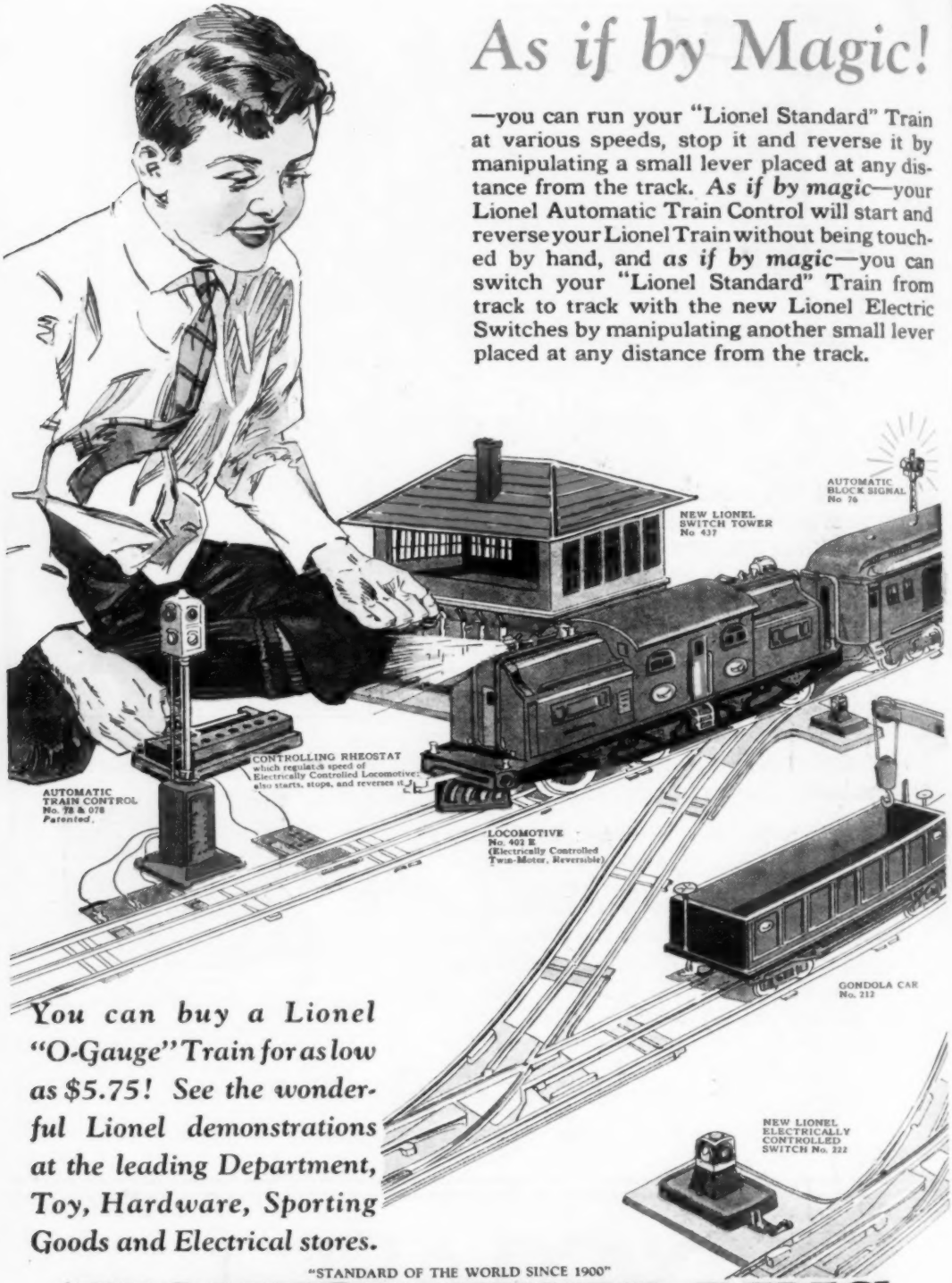
—you can run your "Lionel Standard" Train at various speeds, stop it and reverse it by manipulating a small lever placed at any distance from the track. *As if by magic*—your Lionel Automatic Train Control will start and reverse your Lionel Train without being touched by hand, and *as if by magic*—you can switch your "Lionel Standard" Train from track to track with the new Lionel Electric Switches by manipulating another small lever placed at any distance from the track.



You can buy a Lionel "O-Gauge" Train for as low as $5.75! See the wonderful Lionel demonstrations at the leading Department, Toy, Hardware, Sporting Goods and Electrical stores.

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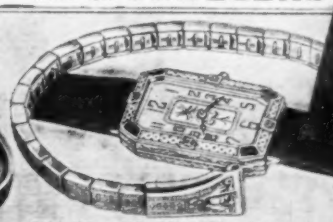

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World's Greatest Toolmakers
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Has a powerful reversing electric motor and big book showing how to make over 200 models. Sent prepaid upon receipt of price if not at your dealer's.

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Get the newest thing in construction toys. Building with Meccano is dead easy. No study required. Build your models in bright colors—flaming red for the Fire Engine, olive green for the Tank Car—only Multicolor Meccano gives you this, yet it costs no more.

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Model of Windmill built with the new Multicolor Meccano

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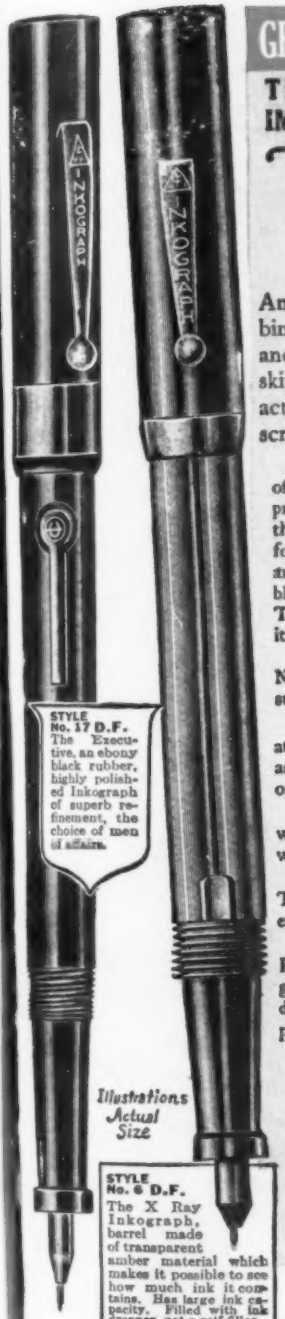

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The INKOGRAPH ACCOMPLISHMENT

That 14kt solid gold ball like point which is hard, round and smooth, glides with ease over the coarsest paper and makes it possible to write in ink as rapidly as with the softest lead pencil.

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Your name, address an style number of the Inkograph of your choice are sufficient. Pay postman $2.98 plus postage on delivery. Specify if you want ladies' size. When cash accompanies order Inkograph will be sent postage prepaid. If within ten days the Inkographdoes not prove satisfactory return it and we'll refund your money.

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Lifts 75 Tons—because the smaller parts are accurately made

The combined efforts of many small parts, accurately made, result in this derrick's lifting 75 tons. Although your work may be an everyday job, a repair job at home or work on a hobby, and the parts may not be required to withstand such a strain, they should nevertheless fit with the necessary accuracy. Tools of Brown & Sharpe Quality help you do difficult jobs more easily.

Ask your dealer for a free copy of Brown & Sharpe Small Tool Catalog No. 30. Keep it in your kit to use as a reference when buying tools. If your dealer cannot furnish a copy, write us direct.

BROWN & SHARPE TOOLS

Micrometer Caliper No. 11 is but one of over 2300 different tools in the complete Brown & Sharpe Line. It measures from 0 to 1" by thousandths of an inch and assures accuracy in small parts.

BROWN & SHARPE MFG. CO., Providence R. I., U. S. A.

10 Days Free Trial

In your own home—

Here is just what you have been waiting for! The big opportunity! The SpeedWay Shop is a compact and efficient electric workshop for you men who are "handy" with tools, mechanics, or experimenters!

The SpeedWay Shop is driven by the powerful back geared SpeedWay electric motor—famous the world over.

We are offering you the Shop on a 10 day free trial in your own home. Test it! Experiment with it! Use it as you would your own! You will find it the handiest, fastest metal and wood working outfit you have ever laid your eyes on. It is complete in every sense, and ready for operation.

Fascinating! Intriguing! Interesting! That's what users say about the work you perform in your own home with the SpeedWay Shop and Tools. You can make almost anything — attractive, odd furniture, toys, home and garden improvements, radio manufacturing, consoles, bric-a-brac, book shelves — countless useful articles. You can do buffing, polishing, grinding and drilling either at the bench or wherever you find a lamp socket and—all of this for only $10.00 down—the balance on easy terms.

8 motor driven tools

Try them in your own home

A complete wood-turning **lathe**, **bench saw**, **scroll** or jig saw, a portable electric **hand** saw and all accessories for both portable and stationary power **drilling**, **buffing**, **grinding** and **cleaning**. Attaches to any light socket and converts a work bench into a complete **private tool and machine shop**. You can buy 2 or 3 units at first and add others as you need them.

Portable Saw Unit

Jig-Saw Unit

A Blueprint a month FREE

Each month for a year we will furnish you a blueprint of your own selection free to help you to get maximum service from the SpeedWay Shop and Tools. Write for a list of the interesting blueprints we have for you.

$10.00 Down

Want a shop? It's easy to own one. We make it easy to pay while you enjoy a SpeedWay Shop right in your own home.

Write for full information

Don't hesitate. We want you to know more about the SpeedWay Shop and Tools. Every tool in the "Shop" is high-grade, built for regular work. A money maker for the small job man. A pleasure for the householder.

Get the full particulars. Send in the coupon today.

ELECTRO-MAGNETIC TOOL CO.

Dept. 212—1830 S. 52nd Ave.,
CICERO (adjoining Chicago), ILLINOIS

SEND COUPON NOW

Electro Magnetic Tool Co., Dept. 212
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Dear Sirs: Please send me full particulars about your 10 Day Free Trial, Free Blueprints and Your Easy $10.00 Down Payment plan on the SpeedWay Shop.

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THE annual question is in everybody's mind. The annual gift list is in everybody's pocket. Here is just the right present for son or daughter, for best friend, for close business associate—in fact

A Gift for Everybody

The Remington Portable Typewriter

It may be selected with the assurance that it is the recognized leader—in sales and popularity. It meets every requirement of personal writing. It is the world's lightest writing machine with standard keyboard—tips the scales at only 8½ pounds net. And it is the most compact of all typewriters—fits in a carrying case only four inches high.

It is faster than the speed demands of even the most expert user; and its dependability is *Remington dependability.*

From every standpoint it is *the* gift for everybody.

Terms as low as $5 monthly. Sold by Remington branches and dealers everywhere. Send for our booklet "For You—For Everybody." Address Dept. 12.

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374 Broadway New York
Branches Everywhere
Remington Typewriter Company of Canada, Ltd.
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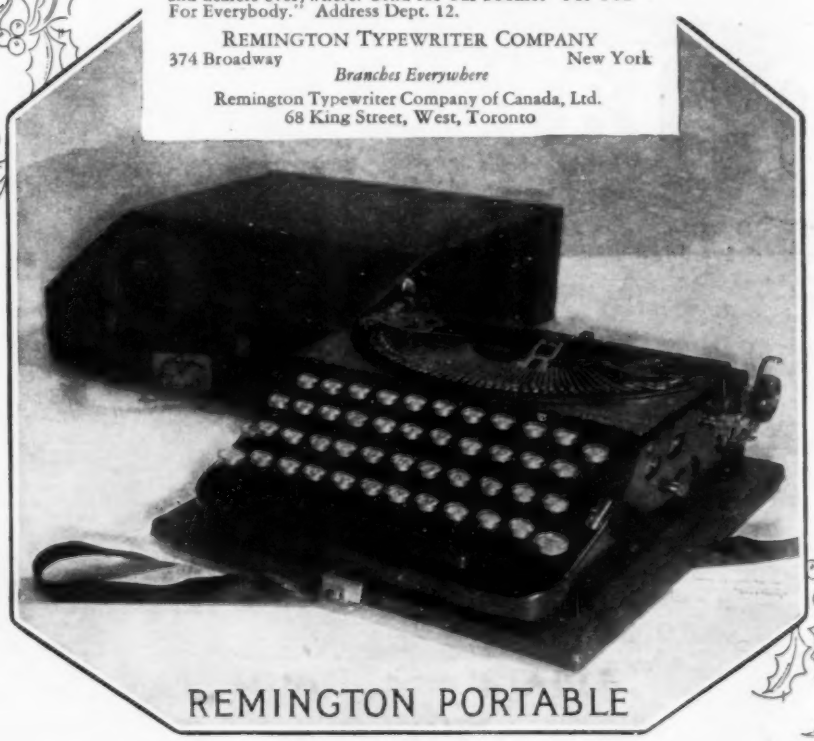
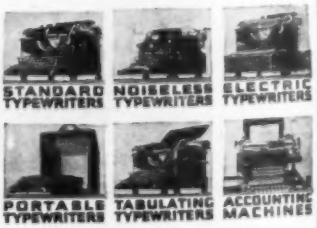


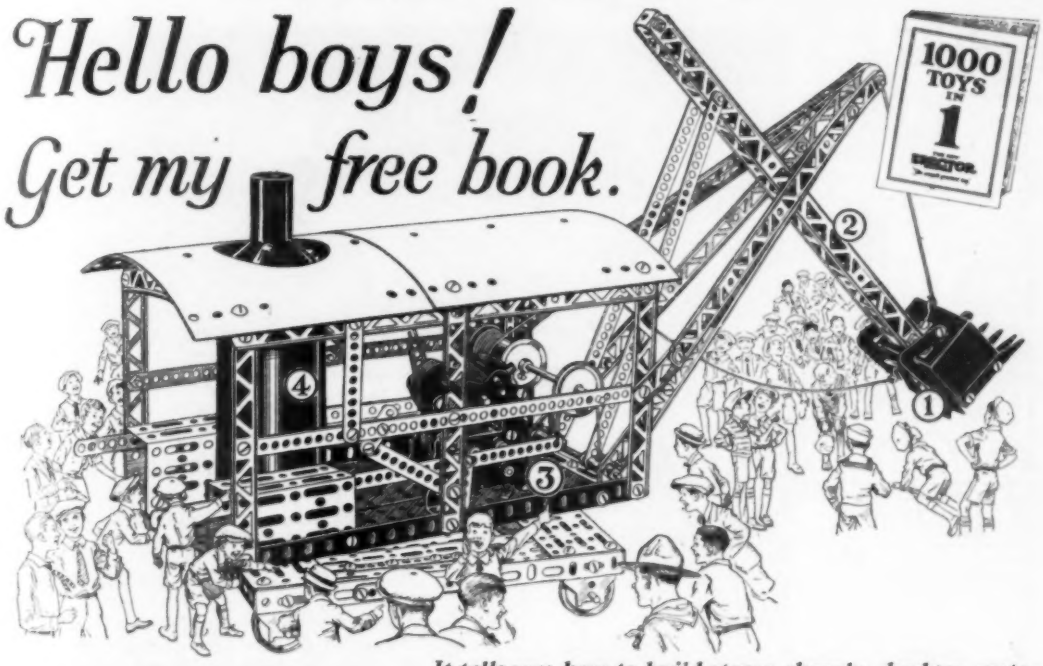
Remington Typewriters



A MACHINE FOR EVERY PURPOSE

Remington-made Paragon Ribbons and Red Seal Carbon Papers always make good impressions

Hello boys! Get my free book.



It tells you how to build steam shovels, dredges, automobiles, aeroplanes, engines—1000 working models, many in colors, all from one marvelous construction set.

JUST think of the fun that is waiting for you when you read about these marvelous working models of the greatest engineering feats—trains, draw-bridges, steam shovels, concrete mixers, lighthouses, engines, motors, dynamos, railroad signals. And when you actually own a new Erector Set you'll get the thrill of your life when the motor starts to purr and the model which you have built with your own hands starts working—Oh, boy! how you will shout.

Christmas or any other time will be the best day of your life when you get your Erector. The box is jammed full of fun. When you lift the lid and see all the wonderful parts, some in colors, your hands will itch to start building models right away. You'll play with Erector first. You'll be playing with Erector a year from now, too.

But send for my book this very day. Then you can show Dad the pictures of these dandy Erector models. He will understand why boys call the New Erector the world's greatest toy.

WHY ERECTOR IS
"The World's Greatest Toy"

1—*Erector Enameled Scoop. Erector Enameled Dredge Bucket. Curved Erector Girders. Giant Fly Wheel Enameled Red*—All Exclusive Erector Features.

2—*Erector Square Girder.* They are real girders just like engineers use in making skyscrapers and bridges.

3—*New Powerful Erector Electric Motor.* (In No. 4 Set and up).—You can make 27 interesting experiments with the Erector Motor alone. You can attach pinions and gears direct to both sides.

4—*Erector Enameled Steam Boiler.* (In No. 7 Set and up).—There is no end to the models that this Erector feature makes possible—Steamboats, Fire Engines, Hoisting Engines, Locomotives, etc.

5—*Erector Parts In Colors.* (In all sets).—Erector is made from structural steel, nickel-plated and lacquered. It is the pioneer construction toy with parts finished in colors, enameled and electrically baked (not just painted). An exclusive Erector feature.

6—*Perforated Strips—Four Holes To The Inch.*

7—New Erector contains more parts and builds more models than any other toy.

8—New Erector contains the greatest assortment of gears—ten in all—from die-cast, beveled gears, solid brass gears, to the big 50-tooth steel gear.

9—*New Erector is Electrified*—Starting with the No. 8 Set you can illuminate your models.

New 1926 Exclusive Erector Features

10—*New No. 10 DeLuxe Book.* Over 200 pages showing how to build 1,000 models.

11—*Big, Solid Steel Disc Wheels*—Electrically enameled in red with oversize balloon tires.

12—Many other new feature parts such as radiators, fenders, auto hood, springs, steering wheel, heavy truck axles—all finished in colors.

13—*New Giant Erector Curved Girder*—Makes very large wheel over 14 feet in circumference.

The Super Erector No. 7—$10.00

The Set that builds the Steam Shovel

THE most popular Erector Set. This is the first set to contain the famous new Erector digger part, so that you can build the Steam Shovel illustrated above. Contains powerful Erector electric motor which makes your model run; new Erector boiler for building engines; also base plates, curved girders, perforated strips, die cast gears, bevelled gears, solid brass gears—473 parts, some in colors, enameled and electrically baked; builds 533 models shown in 76-page manual. Packed in a varnished, hard-wood box. Tell Dad now that this Erector Set will make you happier than any other present.

625 Coal Elevator. End View

MY FREE OFFER When you send this coupon for my free book, you will also get an amazing present; the mysterious Erectorscope. It will mystify your friends. You've never seen anything like it. Just look through the Erectorscope! You won't believe your eyes. Everybody will want to look through it, too. Send the coupon now and get the book and the Erectorscope absolutely free.

THE A. C. GILBERT CO.,
153 Blatchley Ave., New Haven, Conn.

Please send me FREE my copy of the book, "1,000 Toys in 1," and the mysterious Erectorscope.

Name.....

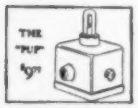
Street.....

City.....State.....

Buy an Erector Today.

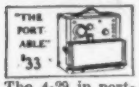
At all stores where toys are shown.

CROSLEY RADIO
All prices slightly higher west of Rocky Mts.



This little double-circuit 1-tube set has made long distance records.

4 tubes. Amazing efficiency, Crescendon equipped!

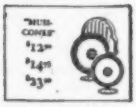


The 4-29 in portable form.

5 tubes, 1-dial control acuminators, Crescendon, power tube adaptability.

5 tubes. True-cascade amplification; non-oscillating and non-radiating.

In a mahogany console. 5-tube 5-50 receiver Crosley Musiconespeaker, ampl. compartment for batteries.



12-inch size, $12.50. Super Musicone, $14.75. Musicone Deluxe, $23.50. Also beautiful Musi-console with room for batteries and accessories, as below.

5-tube 5-38 *with the* CRESCENDON

which builds great volume on distant stations

Sit down before any ordinary 5-tube tuned radio frequency set and turn the dials. Some Stations will come in clear and loud. Others you will hear but faintly and the manner in which they slip away is exasperating.

Then try a Crosley 5-38. From a far-away station come the faint strains of an almost forgotten melody. How keenly you want to hear it! You turn the Crescendon and, with a rush of swelling tone, the music suddenly reaches a volume and clarity as though it were broadcast from a station but a few miles away!

Such is the function of the Crescendon—an exclusive Crosley device—a feature of this 5-tube tuned radio frequency set, known as the Crosley 5-38.

In external appearance, too, the set will delight you. The beauty of its two-tone mahogany cabinet is enhanced by art metal trimmings which harmonize in color and design. The dials are recessed behind windows and vernier-controlled condensers make tuning easy and accurate.

Like all Crosley radio sets, the famous 5-38 is available at extremely low cost—the result of Crosley mass production which has established the world's greatest radio values.

THE CROSLEY RADIO CORPORATION, CINCINNATI—POWEL CROSLEY, Jr., President

Crosley manufactures radio receiving sets, which are licensed under Armstrong U. S. Patent No. 1,113,149 or under patent applications of Radio Frequency Laboratories, Inc., and other patents issued and pending. Owning and operating station WLW, first remote control super-power station in America. All prices without accessories.

For Catalog write Dept. 15

Crosley Features

"CRESCENDON"

When, on ordinary radios, ears must strain to catch a station miles away, a turn of the Crescendon on Crosley radios instantly swells reception to room-filling volume. An exclusive Crosley feature.

ALL-METAL SHIELDED CHASSIS

This truly great radio achievement, found in several Crosley sets, furnishes a substantial frame for mounting elements, produces excellent alignment of condensers, shields the units from each other, prevents interstage, improves the stability of the circuit, increases selectivity and saves costs by standardizing this phase of manufacture.

THE SINGLE-DIAL STATION SELECTOR

Nothing in radio equals the joy or the convenience of single dial control. Crosley single drum control enables you to find the stations sought without log book or "tuning"

"THE ACUMINATORS"

Crosley Acuminators permit tuning in — loud and clear—weak stations passed over and entirely missed by ordinary single dial radios. In tuning high powered and local stations they are not used.

HEAD PHONES $3.00

QUALITY AND BEAUTY IN CABINETS AND CONSOLES

Kingsbury Motor Truck, No 318. 25 inches long. Handsomely finished in enamel. Rubber tires. Cushioned bumper. Spring motor, wound crank-fashion from the front. Price $15. West of the Mississippi, $16.50

Load it up and start away!

HAVE a trucking business all your own! Load up to capacity at your "warehouse." Crank your motor—which winds the strong powerful spring. All set! Put the motor into gear with the lever beside the driver's seat. And away you go. Around the corner a package to be delivered. Pull back the lever at the driver's seat—brakes on—the truck has stopped. Deliver your package, and you're off to the next stop. Don't stop to crank yet—your truck will run 200 feet before this is again necessary.

A toy that will make you the envy of every boy on the street. The finest toy we have ever built—and Kingsbury has built fine toys for over 35 years.

Better put this truck on your "Christmas Stocking List" right NOW.

KINGSBURY

MOTOR DRIVEN TOYS

This wonderfully lifelike motor truck is just one of an almost endless series of mechanical and pull toys made in Keene, N. H., by Kingsbury. If your dealer is not now showing Kingsbury Toys for Christmas, send for Catalog that shows and describes Fire Engines, Ladder Trucks, Hose Wagons, Busses, Delivery Wagons, Tractors, Trolley Cars—every kind of wheeled toy, priced within everybody's means—toys from $1 up.

THIS NON-SKID ERASER, 10c

Send 10c coin for this miniature disc wheel whose non-skid balloon tire is a rubber eraser.

KINGSBURY MANUFACTURING CO.

83 MYRTLE ST. KEENE, NEW HAMPSHIRE

Dealers: Our complete line is sold and displayed by Riemann-Seabrey Co., 215 Fourth Ave., New York City

Isn't it natural?

A EUROPEAN WIT says "Americans not only *want* the best of everything—but spare nothing to *get* the best of everything." A characteristic that explains, perhaps, why American cigarette smokers so willingly pay a few cents more to get Fatimas

F A T I M A

"What a whale of a difference just a few cents make"

LIGGETT & MYERS TOBACCO CO.

Try this NEW way to improve your craftsmanship

LePage's New Books will show you how

WITH the coming of the long winter evenings, the best time of the year is here for the man with the Home Work Shop Hobby. What articles of furniture are you planning to make this winter? Whether it is a radio cabinet, end table, book case, cedar chest, or any other piece of household furniture, LePage's New Books can be of practical help to you.

"LePage's Practical Suggestions for the Home Work Shop," and, "LePage's Gesso-Craft Book," will help you come closer to equalling the skill of the trained cabinet maker, turning your evenings spent on this hobby to better account. They tell you how to make strong joints with glue, and not only with glue, but with glue in its most convenient form—LePage's Liquid Glue.

These books also show you how to cover up small defects in your craftsmanship. Now and then a tool will slip and an error is made. Or there are holes to be filled where nails or screws have been countersunk. Or the edges of a joint are not exactly even. A simple new way to repair these defects is with the use of LePage's Gesso instead of putty. LePage's Gesso will stick to any surface—wood, metal, glass, etc. It can be sandpapered, planed and painted or stained just like wood. We give you in the small panel below a simple formula for making LePage's Gesso, but of course we tell you more about it in the books themselves, together with practical information on decorating your finished articles with Gesso.

Handiest tool in your Work Shop

Perhaps you have never thought of the special advantages of using LePage's Liquid Glue. It is always ready for immediate use. No weighing, soaking or heating is required. Its quality is always the same. It "sets" slowly enough so that you have plenty of time to place the joints together exactly as they should go. Slow setting also allows LePage's to penetrate the wood, increasing the strength of the joint. LePage's Liquid Glue is equal in strength to any animal glue. Buy a can for your workshop. It is the easiest, quickest, handiest form of Glue. Insist on LePage's.

Recipe for Making LePage's Gesso

To make one cup of LePage's Gesso, you need 1 gill can of **LePage's Glue**, 1¼ cups whiting, 3 teaspoons linseed oil and 3 teaspoons varnish. Place whiting in mixing bowl and pour in slowly in this order: **LePage's Glue**, linseed oil, and varnish. Mix until smooth. All ingredients obtainable at nearest hardware store.

Send 10 Cents for These NEW *LePage's Books*

THE practical and useful help of these two books is yours for only 10 cents. Just write your name and address on the coupon below, tear the coupon out and mail it to us today with 10 cents in coin or stamps, and we will at once send you a copy of these two LePage's Books, postage paid. Address LePage's Craft League, Dept. RR-3, Gloucester, Mass. Tear out the coupon now so you will not forget it.

LE PAGE'S GLUE

Bottles, Tubes, Cans

LePage's Craft League, Dept. RR-3, Gloucester, Mass.

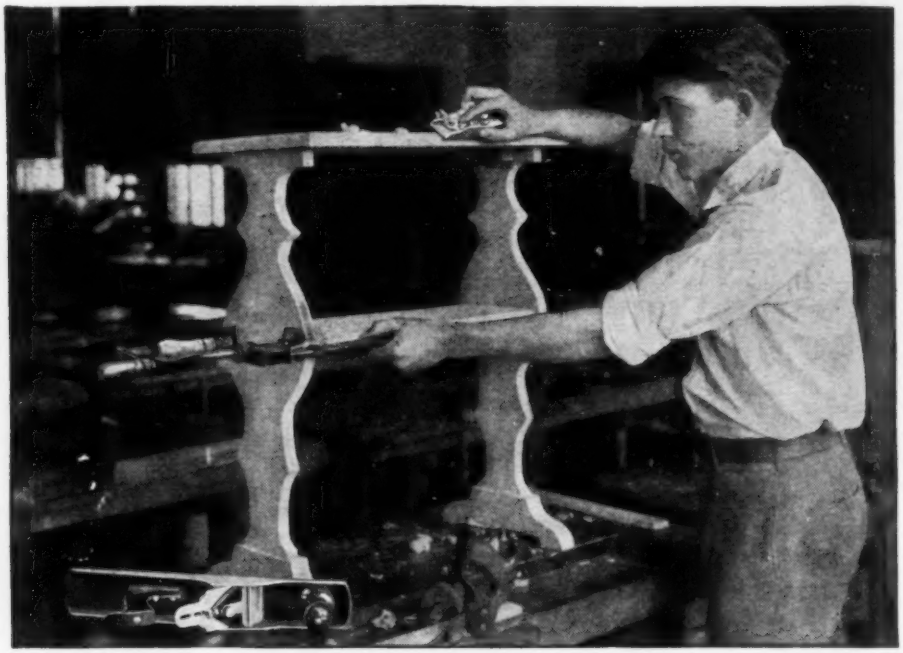
Gentlemen: Enclosed you will find 10 cents (coin or stamps) in payment for "LePage's Practical Suggestions for the Home Work Shop," and "LePage's Gesso-Craft Book." Please send a copy of each to:

Name.....

Street.....

City.....State.....

He has good tools—*his work shows it*



NO REASON now for anyone to work with unsatisfactory tools. In every class of tools there are leaders. Devised by workers who simply had to have something better than what they were using. Produced by manufacturers who have overlooked nothing that might better design and quality. Sold at prices which every worker can afford to pay.

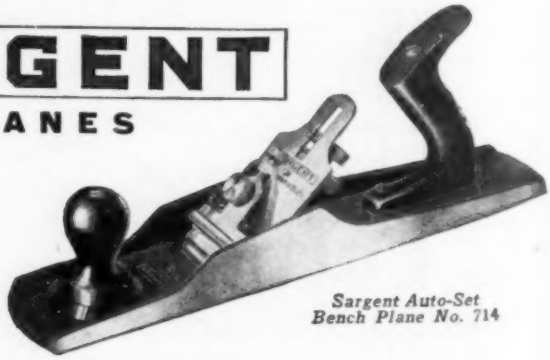
Sargent Planes will help you to get better results. Quicker results, because of their simplicity of adjustment and ease of handling. The Auto-Set has a feature found in no other plane. The cutter may be removed, sharpened and replaced without changing original adjustment. With this and the small Steel Block Plane you can do practically every finishing job that comes to a school or home work-bench.

See them at your hardware dealer's. Note the perfect balance and finish! The cutters of special chromium steel! How keen these are—and they keep that way even after a lot of planing. You will be surprised at the prices—too. Low, for the tools that so many professional carpenters use. Write us for booklet.

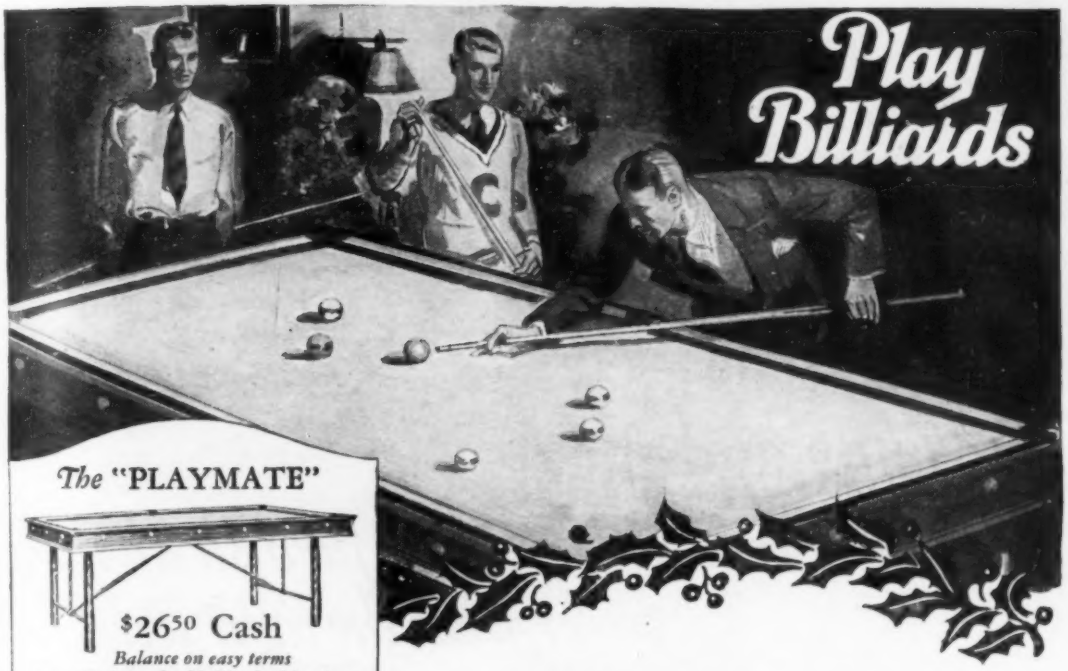
SARGENT & COMPANY, *Manufacturers*
49 Water Street New Haven, Conn.

SARGENT
PLANES

Sargent Steel Block Plane No. 5206



Sargent Auto-Set Bench Plane No. 714



The "PLAYMATE"

$26.50 Cash

Balance on easy terms

A modified standard billiard table, size 3½ x 7 ft., with folding legs. Has genuine slate bed and all the playing qualities of the professional size table, cushions, angles and balls being scaled down with scientific precision. Comes complete with full playing equipment.

At a slight additional cost interchangeable cushions may be had, making it available for either carom or pocket billiards. Smaller tables for pocket billiards only, sizes 2½ x 5 ft. and 3 x 6 ft., may be had at still lower prices.

Make This Christmas The Best Ever

Have Dad Give You a Brunswick Home Billiard Table

NO game will provide more genuine pleasure, more fascinating entertainment, more lasting enjoyment than a Home Billiard table. It is the greatest gift of all—and lasts for years and years.

Right now is the time—of all times—to obtain one. For billiards is a sport you and everyone you know can play and enjoy. And the more you play it the more interesting it becomes. It is splendid exercise, does you good both physically and mentally. Develops judgment, clear thinking and coolness.

Brunswick Home Billiard Tables are Inexpensive

A small initial deposit brings one to your home in time for Christmas. The balance may be paid as you play. No extra space or special room is needed for the newest Brunswick Home Table—the Playmate. And there are a number of other attractive models.

THE BRUNSWICK-BALKE-COLLENDER COMPANY

Established 1845 *Branches in All Principal Cities of the U. S. and Canada*

Write today for full descriptions, prices and easy terms. Fill out and mail the coupon NOW!

THE BRUNSWICK-BALKE-COLLENDER COMPANY
Dept. H-1243, 623 S. Wabash Avenue, Chicago, Ill.
Gentlemen: Please send me complete descriptions of your home billiard tables, together with prices and terms, and oblige.

Name.....

Address.....

The new Balkite "B" at $27.50 and the Balkite Trickle Charger *furnish all radio power from the light socket*

The New Balkite Charger

MODEL J. Has low trickle charge rate and a high rate for rapid charging. Can thus be used either as a trickle or as a high rate charger. Special model for 25 40 cycles. Price $19.50. West of Rockies $20. (In Canada $27.50.)

Balkite Combination

When connected to the "A" battery supplies automatic power to both "A" and "B" circuits. Automatically controlled by the filament switch on your set. Will serve any set now using either 4 or 6-volt "A" batteries and requiring not more than 30 milliamperes at 135 volts of "B" current —sets of 8 tubes or less. Price $59.50. (In Canada $83.)

Operate your present set from the light socket by adding the new Balkite "B" and the Balkite Trickle Charger.

Balkite "B" eliminates "B" batteries entirely and supplies "B" current from the light socket. Balkite "B"-W at $27.50 for sets of 5 tubes or less requiring 67 to 90 volts. Balkite "B"-X at $42 for sets of up to 8 tubes. Balkite "B"-Y at $69 for any standard set.

The Balkite Trickle Charger at $10 is probably the most popular of all chargers. Over 200,000 are now in service. Instead of operating intermittently at a high rate, it operates continuously at a low rate, thus automatically keeping the battery at full charge In effect it converts your "A" battery into a light socket "A" power supply.

Both Balkite "B" and the Balkite Trickle Charger are noiseless in operation, permanent pieces of equipment, with nothing to renew or replace. Other than a little household current, their first cost is the last. Add these Balkite Units now and own a radio set always ready to operate at its best.

Balkite Trickle Charger $10.50 west of Rockies. In Canada, Trickle Charger $15; "B"-W $39; "B"-X $59.50; "B"-Y $96.

FANSTEEL PRODUCTS COMPANY, Inc., North Chicago, Ill.

Listen to the Balkite Radio Symphony Concerts with Walter Damrosch and the New York Symphony, Saturday nights, 9 P. M., Eastern Standard Time. Stations WEAF, WEEI, WGR, WFI WCAE, WSAI, WTAM, WWJ, WGN, WCCO, KSD, WDAF.

FANSTEEL

Balkite

Radio Power Units

Ives Electric Reversing Locomotive. **The third successful year. Operated by Ives Push Button Control. Press the button to stop—again to reverse.**

You couldn't have more fun if you ran the famous *Olympian Flyer!*

OVER the Rockies on its electrified track daily speeds the famous train, Olympian, on its way to the sunny Pacific. It has every modern improvement ever invented for electric trains—*and you will find these same improvements in Ives Electric Trains.*

As your Ives Express speeds around the track, Banjo Signal 333 flashes out the warning at the highway crossings, keeping the track clear (*Safety First!*). Signal 331 flashes to the engineer danger or clear track, as the case may be.

When Signal 331 flashes the red, press the button and the train stops. Press it again, and it backs up to the point of safety. Now the light flashes green. Press the button twice, and proceed on your journey. How can you beat it for real good fun and realism!

Trains of superb power

IVES locomotives have all kinds of power for pulling long trains at express speed. All motors, even the smallest, are built with extreme care. There is an almost endless variety of passenger and freight cars, stations, etc. Prices range from the $1.50 mechanical train to the big, complete $50 electric outfit.

Toy, department, electrical, hardware and sporting goods stores sell Ives Trains.

FREE—Biggest, most interesting Train Book for boys ever issued

THE 1926 Book of Ives Trains is the largest, most colorful and fascinating book of miniature railways ever published. It has 44 pages, illustrated in full colors throughout and tells you everything you want to know about electric and mechanical trains. Mail the coupon today.

[*Safety First!*]

Ives Automatic Two-Light Target Signal 331
(For any size track)
It flashes red—it flashes green
The prettiest signal ever seen

Ives Automatic Bell-Light Banjo Signal 333
(For any size track)
Three automatic features in one. Ives is the only miniature railway that has this wonderful automatic banjo signal.

The Ives Manufacturing Corporation
Established 1868
Holland Avenue, Dept. D-7, Bridgeport, Conn.

IVES ELECTRIC AND MECHANICAL TRAINS

THE IVES MANUFACTURING CORPORATION
Dept. D-7, Holland Avenue, Bridgeport, Conn.
Please mail me your FREE 1926 Book of Ives Trains, containing 44 pages in full colors.

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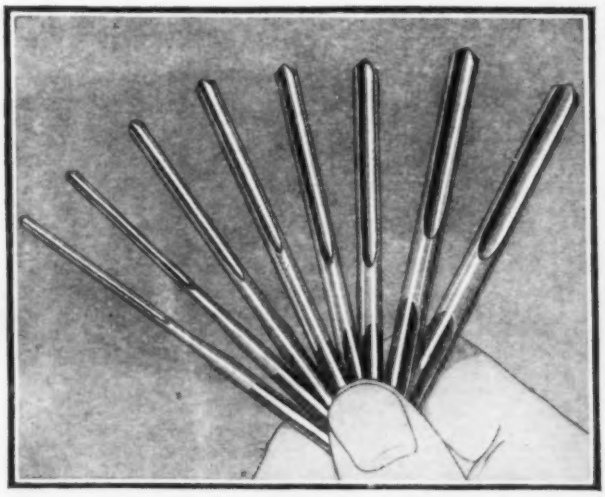
Street.....

City.....State.....



Here are the eight different size drill points included with Mr. Punch.

To bore clean holes quickly—easily without splitting or cracking

Use Mr. Punch

—the Goodell-Pratt Automatic Drill

THIS automatic drill makes holes of any diameter from 1/16 to 11/64 of an inch—and does it quickly—and clean as a whistle.

You push—Mr. Punch twists. No skill is needed to do the job right. No cracking, or splitting, or splintering. Hard wood, soft wood, plaster—are all alike to Mr. Punch.

A hollow space in the handle is divided into 8 compartments, each to hold a drill point of the size marked on it.

To get the drill you want just turn the cap so that the top hole is opposite the compartment the desired drill is in. The point is released through the top hole.

Mr. Punch is beautifully nickeled and polished. He is 10 in. long and weighs 8 ounces. Good hardware dealers everywhere sell Mr. Punch. If yours doesn't, write us.

Send for the book of 1500 Tools

Catalog No. 16 pictures and describes each of the famous Good Tools made by Goodell-Pratt. This book is interesting and valuable to everyone who works with tools. It's FREE. Write for a copy NOW.

GOODELL-PRATT COMPANY, GREENFIELD, MASS., U. S. A.

MAKERS OF *Toolsmiths* MR. PUNCH

GOODELL-PRATT

1500 GOOD TOOLS

Newest Invention! SPORS Pen

No wonder it's so easy to make $20 a day when you can distribute this new unbreakable self-filling Fountain Pen with these latest improved inventions.

IMPORTED GUARANTEED FOR TWO YEARS —WRITES LIKE A $7 PEN.

FREE SILK NECK RIBBON TO MATCH WITH EACH LADIES' STYLE PEN

Your Sample Pen Costs You ONLY 65¢ Sells for $1.25

There Are Dollars to Be Made

almost every time you turn around. Fountain Pens are always in demand. Nearly everyone uses them, especially when they can get a Fountain Pen like ours for only $1.25 that writes as good as a pen selling for three and four times this price.

7 BEAUTIFUL COLORS: Red, Green, Yellow, Purple, Mahogany and Green Molot

Money Back Guarantee

If you cannot make at least $10.00 a day, all you have to do is to return unsold goods to us any time within 60 days and we will refund your money at once.

Could we give you a guarantee like this if we had any doubt that the average person cannot make at least $10 a day?

FREE

Big Specialty Catalog showing Best Sellers from all parts of the world.

WRITES AS SMOOTH AS A PENCIL ON ANY KIND OF PAPER. 8 GROOVES FOR INK TO FEED. EASILY TAKEN OUT AND CLEANED. EXTRA POINTS COST ONLY 15¢.

WHAT TO GET FOR CHRISTMAS?

Do you realize that people all over the United States are asking that very question? Wondering what they should get for Susie or Bill or Mother or Dad or Brother? Show them these new style unbreakable SPORS pens, which come in different colors in either the ladies' or men's style and a sale is made every time. These pens are put up in beautiful holly boxes all ready for the customer to send out before Christmas.

STRONG ATTACHED CLIP

BARREL AND CAP MADE OF THE BEST AND STRONGEST MATERIAL WHICH WILL LAST PRACTICALLY A LIFETIME

Biggest improvement ever thought of in pen history. Small air tight place for point keeps ink from drying and will write the instant it touches the paper without first shaking the pen.

60-DAY TRIAL

Money back if not pleased. A perfect pen for every need under all conditions—for any kind of paper.

F. SPORS & CO.,
300 Main St., Lesueur Center, Minn.

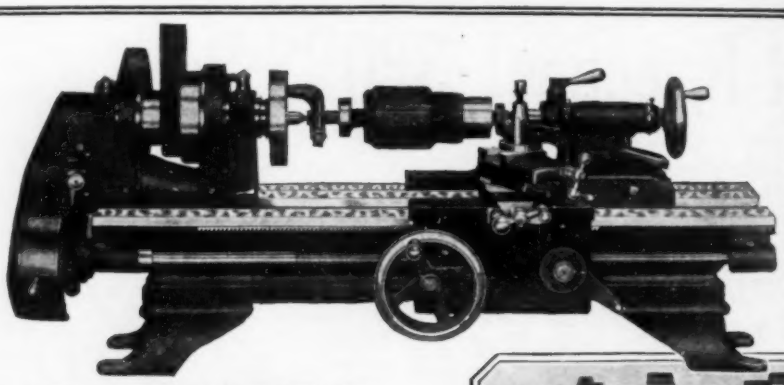
- ☐ Send me one Spors pen, 65c c. o. d., plus postage.
- ☐ Send me 12 Spors pens, $6.42 c. o. d., plus postage.
- ☐ Send me 36 Spors pens, $18 c. o. d., plus postage.
- ☐ Send me catalog, no obligation on my part.

Mark X opposite proposition interested in.

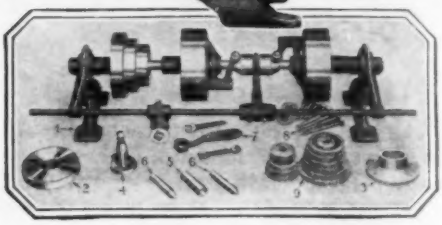
Name.....

Address.....

City.....*State*.....



South Bend No. 22 Back Geared Screw Cutting Lathe
9¼" x 3'; Swing over bed, 9¼"; distance between centers, 16½"; width of belt cone drive, 1"; length of bed, 3 ft. Countershaft and equipment as shown below included without extra charge. Shipping weight, 350 lbs.



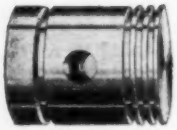
9 INCH
Back Geared Screw Cutting
LATHE

with Automatic Feed, 3/4 in. Hollow Spindle, and Graduated Compound Rest. Double Friction Countershaft Drive included

Only $150 Easy Payments if desired

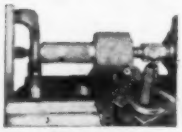
This is the same 9" x 3' South Bend Lathe used in thousands of shops—a high-grade tool of accuracy and precision. To make this low price possible, we have stripped the Lathe of all parts not needed in the average shop. You waste no money on equipment seldom used. You buy the utmost for your Lathe dollar.

Some of the Work This Lathe Will Do



Piston Work

Armature Work



Cutting Threads

This 9" x 3' Lathe will cut standard screw threads. It will turn, bore, drill, chuck, face file, polish, ream, grind, etc. In fact, it will, within its capacity, take care of practically all kinds of machine work on all kinds of metal, fibre, hard rubber and wood.

Takes Only 1/4 H. P. to Run

Operated by Countershaft or Motor Drive. Requires only 1/4 H. P. Motor, and can be driven from lamp socket.

Easy Payments

Lathe shipped for small down payment. Balance can be met from the extra income Lathe will save and make for you. Free Book "How to Run a Lathe" sent to each purchaser.

Write for Bulletin 22-J

South Bend Lathe Works
816 E. Madison St. South Bend, Ind.

Attachments, Chucks and Tools for this Lathe

1—Hand Wheel Draw-in Collet Chuck
2—Hand Lever Draw-in Collet Chuck
3—Graduated Taper Attachments
4—Milling and Key Way Cutting Attachment
5—Electric Grinding Attachment
6—Electric Mica Undercutter
7—Semi-Automatic Bed Turret
8—Thread Indicator
9—Adjustable Thread Cutting Stop
10—Step Chuck and Closer
11—Independent 4-Jaw 6-inch Chuck
12—Universal 3-Jaw 4-inch Chuck
13—Center Rest
14—Follower Rest

SOUTH BEND LATHES

52 WEEKS

ONE FULL YEAR *to* PAY

12 MONTHS

PAY NEXT YEAR For Your Xmas Gifts

DIAMONDS WATCHES & JEWELRY

Biggest Values-Easiest Terms

NO RED TAPE

CASH PRICES *but* CREDIT TERMS

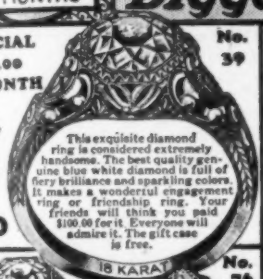
NO DELAY

SPECIAL $5.00 a MONTH

Easy to Pay

$60

No. 39



This exquisite diamond ring is considered extremely handsome. The best quality genuine blue white diamond is full of fiery brilliance and sparkling colors. It makes a wonderful engagement ring or friendship ring. Your friends will think you paid $100.00 for it. Everyone will admire it. The gift case is free.

18 KARAT

Special Sale of Xmas Gifts

Every article in this sale was selected first for quality, because we sell only the finest grades of diamonds, watches and jewelry. Prices were reduced, thus giving our customers the greatest possible value for their money. You can take a year to pay—weekly or monthly as you prefer.

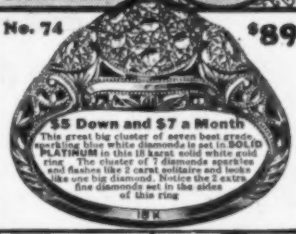
All Credit Dealings Confidential

No one will know that you are buying from us on credit unless you tell them. You will like our confidential system.

Money Back Free Trial Guarantee

The quality and value of everything we sell is fully guaranteed. We allow 10 days free trial. If you return the purchase, we return your deposit. When you return a diamond in exchange for a larger diamond, we allow you 8% more than you paid for it

No. 74 $89

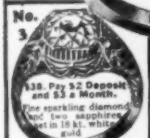


$5 Down and $7 a Month

This great big cluster of seven best grade sparkling blue white diamonds is set in SOLID PLATINUM in this 18 karat solid white gold ring. The cluster of 7 diamonds sparkles and flashes like 2 carat solitaire and looks like one big diamond. Notice the 2 extra fine diamonds set in the sides of this ring

18 K

No. 3



$38. Pay $2 Deposit and $3 a Month.

Fine sparkling diamond and two sapphires set in 18 kt. white gold

No. 76

Extra fine quality diamond of rare brilliancy set in exquisite ring

$99 $9 Deposit $7.50 a Month

No. 58 $42 $1 Deposit $3.33 a Month

4 Diamonds and 4 Sapphires

Ladies small, fashionable wrist watch, 14 karat solid gold case, with 15 jeweled movement, set with 4 diamonds and 4 sapphires. It makes a splendid Christmas present.

No. 78

Large cluster of seven best blue white diamonds set in platinum. The 18 kt. ring has two blue sapphires

$69 $5 Down $5.35 a Month

No. 79

Extra brilliant cluster of seven best diamonds set in platinum in 18 kt. gold ring

$79 $7 Deposit $6 a Month

No. 4

$49. Pay $4 Deposit and $3.75 a Month

Brilliant blue white diamond, 2 sapphires, set in 18 kt. gold

No. 77

$95. Pay $9 Deposit and $7.50 a Month

For man's heavy 18 kt. ring, with fine blue white diamond

18 K

14 Karat Solid Gold

No. 11—$19

$1.00 Deposit

$1.50 a Month

Stylish 14 Kt. solid gold wrist watch with 15 jeweled movement. Worth $30. Extra sterling silver bracelet free.

No. 80

Pay $4.60 a month for cluster of seven fine diamonds set in platinum. The 18 kt. ring is set with blue sapphires

$59 $4 Deposit

No. 81

Men's cluster of seven diamonds

18K

$69 $5 Deposit $5.35 a Month

SOLID PLATINUM RING

Perfect Diamond

No. 75 $98

$8 Deposit — $7.50 A Month

The sparkling, blue white diamond set in this ring is guaranteed the finest quality—perfect and flawless. It has no imperfections of any kind. All the colors of the rainbow flash from this diamond. The ring is genuine solid platinum. It makes a wonderful engagement ring.

PLATINUM

Choice of Elgin or Waltham Watch

$21 $1.00 Deposit $1.75 a Month

Latest style, handsomely engraved, 12 size watch, octagon shaped, white gold filled case, fitted with your choice of high grade movements. It comes in an expensive gift case, has a valuable chain and knife attached

No. 82—$25

$1 Deposit $2 a Month

Men's wristwatch, 15 jeweled, high grade movement, in choice of white or green gold filled case. Fitted with strong leather strap.

No. 71 $27.50 $2.50 Down $2 a Month

Ladies' Diamond Onyx Ring of very latest style, set with sparkling blue white genuine diamond. The handsome engraved ring is 18 karat solid white gold. The long oval onyx is the most popular style.

No. 72—$20

$2 Deposit

$1.50 a Month

Rectangular shaped onyx ring set with sparkling blue white diamond. The 18 karat ring is richly engraved.

18 K

3 Large Diamonds 4 Smaller Diamonds 8 Sapphires

No. 73—$109

$9.00 Deposit

$8.35 a Month

Dinner rings like this are the style today. The exquisite design of this popular ring pleases every one who sees it. The mounting is 18 kt. solid white gold, hand pierced and engraved. The sparkling blue white diamonds are full of brilliancy, and are beautifully set off by the dark blue sapphires.

WRITE FOR CATALOG

If you want something not shown in this advertisement, it is in our catalog. Thousands of bargains in diamonds, watches, wrist watches, jewelry of all kinds, silverware, toilet sets, etc.

Bargains for Cash Buyers

We are the only credit jewelers who also operate a strictly cash jewelry store, famous for its values. Nationally advertised jewelry is sold on credit at the cash store prices. Just mail the coupon

STERLING DIAMOND & WATCH CO.

Square Deal Credit Jewelers—Diamond Importers—Established 1879

1540 BROADWAY Dept. 2233 NEW YORK

MAIL FREE CATALOG COUPON

THIS COUPON MAKES IT EASY

TEAR OUT AND MAIL!

STERLING DIAMOND & WATCH CO., Inc.
1540 Broadway, Dept. 2233, New York, N. Y.
GENTLEMEN; I HAVE SELECTED NUMBER.....

- ☐ Please mail it to me by parcel post, C. O. D. the small deposit and I will pay the postman when he hands the package to me. Send size.....
- ☐ I enclose $..... as a deposit to show my good faith. Please send the article size.....direct to my home for me to wear on free trial.
- ☐ Do not send any jewelry now but send your big bargain catalog to me showing thousands of diamond, watch, jewelry, silverware and toiletware bargains for me to choose.

NAME .....

LOCAL ADDRESS.....

CITY & STATE.....

HARRY HARTZ *says*

"It has been invaluable to me in getting my car ready for many races."

HARRY HARTZ, acclaimed 1926 racing champion, is an enthusiastic user of the Prest-O-Lite 5-in-1 Outfit. Here is his letter:

"I want you to know how well pleased I am with your Prest-O-Lite 5-in-1 Outfit. It has been invaluable to me in getting my car ready for many races.

"It is the most convenient outfit I have ever used, and the different torches and soldering iron make it possible for us to perform delicate heating, melting and soldering jobs that would be impossible with any other kind of heat unit."

Harry Hartz

The Prest-O-Lite 5-in-1 Outfit will save time and money in any service station or garage. Four different size torch heads give just the right flame for every job. Easily carried anywhere. No delay, no pumping, no generating. Operates on Prest-O-Lite Gas.

Complete in canvas roll case; four torch heads, soldering iron, hose and wrench, $7.50. Ask about this equipment at any Prest-O-Lite Service Station or write us for full details.

THE PREST-O-LITE CO., INC.
INDIANAPOLIS, IND.
New York San Francisco
In Canada: Prest-O-Lite Company of Canada, Ltd.
Toronto, Ontario

Prest-O-Lite Gas

"The gas of a thousand uses"

$7.50

Convenient Canvas Roll Case

New—Wonderful
Soldering Iron and Blow Torch
In One!

Saves time, trouble and money for EVERY householder, farmer, auto owner, mechanic, tinsmith, radio fan, plumber, electrician, dentist, jeweler, painter, printer, garage, repair shop.

For every handy man! Pays for itself in one job! Enables you to do easily a lot of work that would otherwise require a plumber or tinsmith. Needs no pump or pressure system—no stove—no charcoal pot—no separate blow torch. No fussing! No trouble.

Burns an hour at less than ¼ cent for gasoline. Ready in a jiffy! Remove copper point and you have an ideal BLOW TORCH for burning off old paint, tempering tools, thawing frozen pipes, etc., etc.

Send No Money
10 Days FREE Trial

The Justrite will be sent you prepaid complete, with sal ammoniac and solder, for ten days' trial. When it arrives simply pay postman $3.00. If not satisfied after 10 days, just mail it back and your $3.00 will be returned at once. Write us TODAY!

Agents!

Get our extremely liberal offer NOW! Sales come so fast you'll be amazed! Our agents tell us that just as soon as people see how the Justrite works and how much time and trouble it saves, they want it! Nine times out of ten a demonstration means a sale. Drop us a postcard for our extremely liberal offer. Do it TODAY!

Justrite Mfg. Co., Dept. 13-59
2071 Southport Ave. Chicago, Ill.

DARCHE "CALL-ME" ELECTRIC ALARM AND LIGHT CLOCK

Will ring until you get up and STOP it. No home complete without one. Can be used as an "alarm clock" or "mantel clock." With a little effort on your part you can get one

FREE OUR OFFER TELLS YOU HOW

Agents, here is a big money-maker, no competition, sells on sight. A good punch board proposition. Write today for our descriptive literature. An ideal GIFT for any occasion. Mahogany finish. Size 10½ x 8½ x 4. This applies to U. S. only.

Darche Mfg. Co., 643 Washington Blvd., Chicago

BE PRESIDENT OF YOUR OWN COMPANY

CONCEIVE that *of all methods* present or past, the Nestler Rubber Fusing Process (U. S. Pat. No. 1,354,992) alone, produces a positive fusion or welding of new and old rubber! —The first and only practical and successful method of re-rubbering a tread worn tire, is here—a simple, quick, inexpensive process that makes tires new again and cuts tire costs in half!

Each year since 1917 thousands of tires have been successfully Nestlerized annually by ourselves and licensees. Due to increased demand caused by high tire prices we have decided to issue a limited number of additional licenses. License rights will include protected territories, free instruction, and full cooperation. 17 million cars and 34 million tires replaced annually constitute a *limitless* opportunity for business and profit.

The demand for territories is great and prompt action is vital. A printed proposition with full facts and detailed information is now ready. Write for it TODAY.

NESTLER RUBBER FUSING STATION TIRES

NESTLER RUBBER FUSING CO., Inc.
DEPT. P12
245 W. 55th Street, New York City

7 Tube Set Single Dial Radio

30 DAYS FREE TRIAL

The Metrodyne

ONLY ONE DIAL TO TUNE

Retail Price

$75

Completely Assembled

BIG DISCOUNTS TO AGENTS AND DEALERS

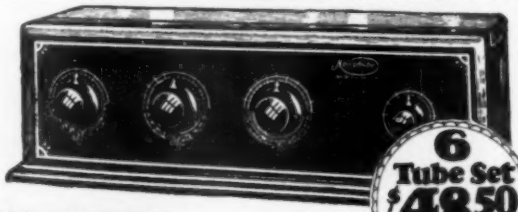
Wonderful offer direct from the factory! The world's greatest radio. A perfect working, single dial control, 7 tube receiver. And just to prove our claims, we will ship it to your home for **30 days' free trial.** Test it under all conditions. Test it for distance, volume and tonal quality—and if you are not convinced that it is the best single dial set you ever heard, return it to the factory. We don't want your money unless you are completely satisfied.

BIG PROFITS TO AGENTS AND DEALERS

Our Agents and Dealers make big money selling Metrodyne Sets. You can work all or part time. Demonstrate the superiority of Metrodynes right in your home. Metrodyne Radios have no competition. Lowest wholesale prices. Demonstrating set on 30 days' free trial. Greatest money-making opportunity. Send coupon below—or a letter—for our agent's proposition.

Metrodyne Super-Seven Radio

A single dial control, 7 tube, tuned radio frequency set. Approved by America's leading radio engineers. Designed and built by radio experts. Only the highest quality low loss parts are used. Magnificent, two-tone walnut cabinet. Artistically gilded genuine Ba elite panel, nickeled piano hinge and cover support. All exposed metal parts are beautifully finished in 24-k gold. Easiest set to operate. Only one small knob tunes in all stations. Dial is electrically lighted so that you can log stations in the dark. Volume control regulates reception from a faint whisper to thunderous volume, 1,000 to 3,000 miles on loud speaker! The Metrodyne Super-Seven is a beautiful and efficient receiver, and we are so sure that you will be delighted with it, that we make this liberal **30 days' free trial offer.** You to be the judge.



6 Tube Set $48.50 RETAIL PRICE *Completely Assembled*

METRODYNE SUPER SIX RADIO ON 30 DAYS' FREE TRIAL

Wonderful 6 tube, long distance radio set. Approved by America's leading Radio Engineers. Easy to operate. Dials log easily. Tune in your favorite stations instantly on the same dial numbers every time. No guessing. **30 days' free trial.**

Mr. Howard of Chicago said, "With 5 Chicago Stations on the air I tuned in 17 out-of-town stations, including New York and San Francisco on loud speaker very loud and clear.

We are one of the pioneers of radio. The success of Metrodyne sets is due to our liberal 30 Days' Free Trial Offer, which gives you the opportunity of trying before buying.

MAIL THIS COUPON or send a postal or letter. Get our proposition before buying a radio. Deal direct with manufacturer—**Save Money.**

METRO ELECTRIC COMPANY
2161-71 N. California Ave., Dept. 149, Chicago, Illinois

Mail COUPON Below!

Let us send you proof of Metrodyne quality

C. J. Walker, Mariposa, Calif., writes: "Received my Metrodyne Single Dial set O. K. I believe that these one-dial sets are going to be excellent sellers. I had no trouble in tuning in stations enough to satisfy anyone, so you will please send me another set."

Roy Bloch, San Francisco, Calif., writes: "Very often we travel from New York to the Hawaiian Islands quickly—from station to station—by means of the little tuning-knob which operates the electrically-lighted dial. The Metrodyne Single Dial Set is much easier to operate than any radio set I've ever seen."

We will send you hundreds of similar letters from owners who acclaim the Metrodyne as the **greatest radio set in the world.** A postal, letter or the coupon brings complete information, testimonials, wholesale prices, and our liberal **30 days' free trial offer.**

METRO ELECTRIC COMPANY
2161-71 N. California Ave., Dept. 149
Chicago, Illinois

Gentlemen:

Send me full particulars about Metrodyne 6 tube and 7 tube sets and your **30 days' free trial offer.**

Name.....

Address.....

.....

If you are interested in AGENT'S proposition, place an "X" in the square → ☐

HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT - HOT

For Every Purse and Purpose

TURNER Master No. 45 BLOTORCH

TURNER Master No. 45 BLOTORCH has these improvements (Turner patents) which give it leadership over all others: *Baffle* in the burner; *Heater Plug* in feed pipe to generate today's fuel, without clogging; *Adjusting Needle* separate from cutoff to prevent enlarging of orifices; *One Opening* in tank above fuel line; *No Soldered Connections*—"no leakers"; *Safety Valve* prevents excess pressure causing leaks and explosions; *Convenient Handle* fits any size hand.

$7.75 Post-paid

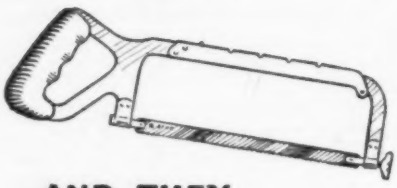
Money back if not satisfied

Nothing Better—if it could be made we would make it.

THE TURNER BRASS WORKS
Charles St., SYCAMORE, ILL.

SAFE - SAFE - SAFE - SAFE - SAFE - SAFE - SAFE - SAFE - SAFE - SAFE - SAFE - SAFE - SAFE - SAFE - SAFE

Skilled Labor is dependent on Good Tools



AND THEY RELY ON STAR BLADES

After 43 years of hack saw research and development work, we offer the Star Special Flexible Blade as the most efficient flexible cutting hack saw blade ever produced.

STAR HACK SAWS

Let us send you samples of this blade free

CLEMSON BROS., Inc., Middletown, N.Y.

Ask for Keds by name

They are not Keds unless the name Keds is on the shoe

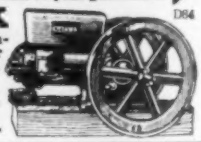
REDUCED PRICES ON ENGINES

Now—big sale on most practical farm engine ever built—the famous OTTAWA. Low cash prices—easy terms—on all sizes 1½ to 7 H-P. Each engine pulls big surplus of power. Easy starting. **You must be satisfied or money refunded.** 30 day trial. 10-year guarantee.

FREE BOOK
—"How to Know Better Engines." Write today for your copy. A post card brings it.

OTTAWA MFG. CO.
531D King St., Ottawa, Kan.
Desk 531D Magee Bldg., Pittsburgh, Pa.

D84



$25 to $45

GET THE **NEW IDEA BATES MOTOR SAW**
—6 *SAWS IN* 1—

Does the work of band-saw, rip-saw, cross-cut, miter, bevel and scroll-saw. A wonder worker for the home shop. Direct drive! Can't stick! Cuts 2" wood. Most amazing variety saw ever invented. Does more, costs less! Not a toy. Write for circular.

BATES MOTORCRAFT COMPANY
Dept. M 25 N. Clinton CHICAGO, ILL.

$6 CASH WITH ORDER

17" Over all, 4" Swing, 11" Centers. Shipping weight 13 lbs. Bed is machined and lathe well built. Also made in larger sizes.

SYPHER MFG. CO., Dept. L, Toledo, O.

SIMONDS

NEW PLANER SAW

Leaves a Surface of Smoothness

Hundreds of plants are replacing their novelty saws with the new Simonds Planer Saws because the Planer Saw leaves a smooth cut at a faster hand feed than is obtainable with novelty saws.

The new Planer Saw can be used for soft or hard wood; for ripping, cutting off, or mitering. And it is made with the same precision and tempered steel that have distinguished Simonds cutting edges for nearly a century. Ask your dealer about the new Simonds Planer Saw. Or write direct for literature and full information.

SIMONDS SAW AND STEEL COMPANY

"The Saw Makers" FITCHBURG, MASS. *Established 1832*

Branches and Service Stations in Principal Cities

CALCULATIONS

in Office, School, Store and Shop can be instantly made with the Midget Slide Rule. It gives the answer to any problem involving fractions, mixed-numbers, decimals, whole-numbers, roots, powers, Logs. and Trig. Functions. Thousands of these rules are used by Accountants, Engineers, Clerks, Students, etc. It is the most versatile calculator ever invented. If you have any figuring to do, order a Midget Slide Rule on trial. Made of aluminum with figures on white celluloid. Size 4". Price with Instruction Book, **$1.50.** Leather Case, **50c** extra. *Catalogue Free.* Sent C. O. D. if desired.

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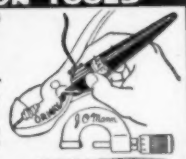
GILSON SLIDE RULE CO., Niles, Mich.

BURN YOUR NAME ON TOOLS

WITH THE

ARKOGRAF



PROTECT YOUR TOOLS FROM THEFT

Write with electricity any name or design on the hardest and finest tools and instruments, or any metal, like writing on paper with pen or pencil.

Complete Outfit $3.50—Prepaid Anywhere

Interesting illustrated circular free. **Write today. Agents wanted.**

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MASTER SLIDE RULE

Takes accurate inside or outside measurements

Works fast. Slides in and out quickly. Durably made of brass trimmed boxwood. Any length 2 to 8 feet.

Ask your dealer.

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You can get yourself no Better Christmas Gift than A Gerstner Tool Chest

Ideal for Toolmakers and Machinists

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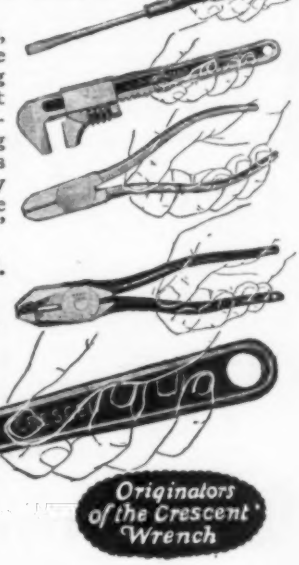
A. Gerstner & Sons

436 Columbia St., DAYTON, OHIO

For quick action

get your hands on one of these CRESCENT-Smith & Hemenway Drop-forged Tools



For turning nuts, bolts, and screws, cutting wire and metal, or doing similar jobs without fumbling or lost motion there is nothing like the tools in this complete line made by the "Originators of the Crescent Wrench."

CRESCENT TOOL CO.

210 Harrison Street

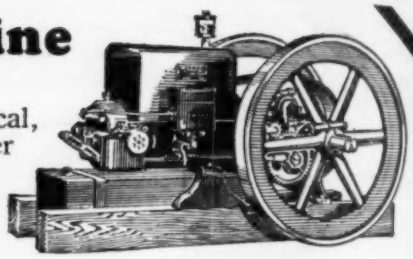
Jamestown, N. Y.

Originators of the Crescent Wrench

$5 DOWN Buys A WITTE STATIONARY ENGINE

The One Profit Engine

NO INTEREST CHARGES



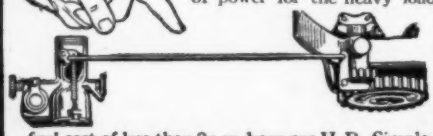
The Most Modern Engine

NOW, more than ever, the need for economical, dependable power is felt by the producer who is faced with ever-increasing labor costs. WITTE Throttling Governor ENGINES answer this important question perfectly—now an economical, dependable power plant is within the reach of everyone.

To-day the WITTE ENGINE sells at the lowest price in history. Into this WITTE has gone the ripe experience of more than 42 years of engine building—over 150,000 users all over the world have placed upon it their stamp of approval. You, too, can put a WITTE on your place, secure in the knowledge that it represents the **Standard of Power.**

The Witte Throttling Governor

the original and leader of the throttling-governor type. An even, steady speed with a big surplus of power for the heavy loads.



The minimum in fuel consumption—the WITTE ENGINE burns kerosene, gasoline, gas-oil, distillate or gas at a fuel cost of less than 2c an hour per H. P. Simple, trouble-proof and guaranteed for a life-time of hard work. Completely equipped with WICO Magneto, speed and power regulator and throttling governor, square, protected tank and die-cast removable bearings.

WITTE ENGINE WORKS

(FOUNDED IN 1870)

1747 Witte Bldg., Kansas City, Mo.
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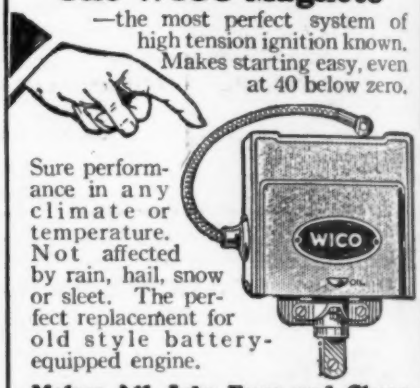
Quick shipments also made from nearest of these warehouses: Minneapolis, Minn.; Atlanta, Ga.; Trenton, N. J.; Richmond, Va.; Tampa, Fla.; New Orleans, La.; Dallas, Tex.; Laredo, Tex.; Denver, Colo.; Billings, Mont.; New York, N. Y.; Albany, N. Y.; Bangor, Me.; Portland, Ore., and Los Angeles, Calif.

The WICO Magneto

—the most perfect system of high tension ignition known. Makes starting easy, even at 40 below zero.



Sure performance in any climate or temperature. Not affected by rain, hail, snow or sleet. The perfect replacement for old style battery-equipped engine.

Makes All Jobs Easy and Cheap

No need to do the hard, back-breaking work—no need to pay high prices for poor labor—you can show $1,000 more profit every year you have a WITTE working on your place. Investigate now!

All sizes 1½ to 30 H.P. Easy Terms. Scrap the Old One—Pay a Little of it Down on the New WITTE.

Ask for Our Big FREE Catalogue

or if interested, ask about Log and Tree Saws, 3 in 1 Saw Rigs, or Pump Outfits.

The New Sypher No. 10

Biggest lathe value on the market. Length over all 30 in.; between centers 14 in. Swing over bed 7¾ in. Includes counter shaft, Bronze taper bearings. Weight 60 lbs. No. 11 Lathe, 40 in. over all; 24 in. centers, 7¾ in. swing. Price $75.00. Time Payments if desired. Write today for circular.

$60

The Sypher Mfg. Co. Dept. D Toledo, Ohio

CRESCENT WOODWORKING MACHINERY

High in quality, moderate in price.

Ask for circulars describing bench machines for the small shop.

If you are interested in the larger machines we can supply you with Band Saws, Saw Tables, Self Feed Rip Saw, Shapers, Jointers, Variety Wood Workers, Planers, Planers and Matchers, Disk Grinders, Cut Off Table, Swing Cut Off Saws, Borers, Hollow Chisel Mortisers, Tenoner, Universal Wood Workers. Ask for circulars.

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"Best Pen I Ever Had—*and costs less!*"

That's what users of the Postal say. New filling method—easiest ever devised. Holds 4 times usual amount of ink. Transparent (always know how much ink you've got!). Unbreakable. Only $2.50! Sent C.O.D. Order now and try it! Money back if you don't like it.

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AMATEUR MECHANICS, REPAIR SHOPS, INVENTORS, STUDENTS

A real machine tool for the home work bench—capacity 4" dia. x 12" length. For Metal—Wood—Composition Materials. Turning—Facing—Boring—Drilling—Winding—Thread Cutting. Accurate—Strong—Quiet—Compact. Slide-rest has travel entire length of bed. Leadscrew inside bed. No. 1 Lathe, plain headstock, $28.00. No. 2 Lathe, back-geared headstock, $59.00. Extra for lathes with 18 inches between centers, $7.00. Complete line of accessories at equally low prices. Write for free catalog.

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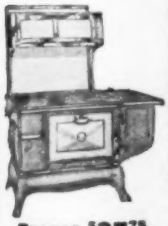
FREE New Book FACTORY PRICES

Direct-to-You Factory Prices

Save 1/3 to 1/2

New FREE book quotes **Reduced Factory Prices.** Introduces sensational **5-Year Guarantee Bond** on Stoves, Ranges, Furnaces. 200 styles and sizes. Beautiful porcelain enamel ranges and combination gas and coal ranges in soft grey and delft blue.

Heating Stoves $27.20 up



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Mahogany porcelain enamel heating stoves. Cash or easy terms—as low as $3 down, $3 monthly. 24 hr. shipments. 30 day **free** trial. 360 day approval test. Satisfaction guaranteed. 26 years in business. 600,000 customers. Write today for your copy of this FREE book.

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"A Kalamazoo . . . Direct to You"
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Sewage Disposal

for Country Home, Camp, or any building in unsewered districts. Protect health and increase property values with **SAN EQUIP SEPTIC TANKS**
Perfect sanitation. Thousands in use. No failures. Ask our specialists for Free Plan Sheets.

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Makers also of sanitary waterless toilets.

MAKES $18.08 In Few Hours

Without experience E. Lube earned $18.08 in one afternoon with our beautiful dress goods, silks and wash fabrics. No capital needed. We show you how to succeed. Write for samples and complete selling instructions.

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WEARING THESE HUTCHINS PANTS

Sensational prices and wonderful quality make Hutchins made-to-measure trousers and knickers sure-fire sellers. You merely take orders, we deliver. Guaranteed finest quality, beautiful materials. Men eager to buy at amazing low prices—$6.45, two pairs for $12. Your big profit in advance.

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Even inexperienced men earn $90, $100 and more every week taking orders. Get your tailored pants FREE and cash in big on this opportunity.

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One Hour each evening 10 evenings

A few simple exercises, practiced quietly for an hour or so each evening, and before you know it you're playing popular tunes on your easy fingering

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Then! Popularity plus; the glad hand of welcome everywhere you go, and the smiles of those whose smiles are worth while. The man who can help others to have a good time is the man who is in demand.

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Mention any other..... How old are you?.....

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Saves Time!
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GET next to Gem Double Life Blades! Let your face revel in double-cool, double-clean, double-quick Gem shaves!

Gem Blades are double-thick and double-reinforced! They won't bend! They won't quiver! They're double-keen! They smooth away the whiskers at the dermal line!

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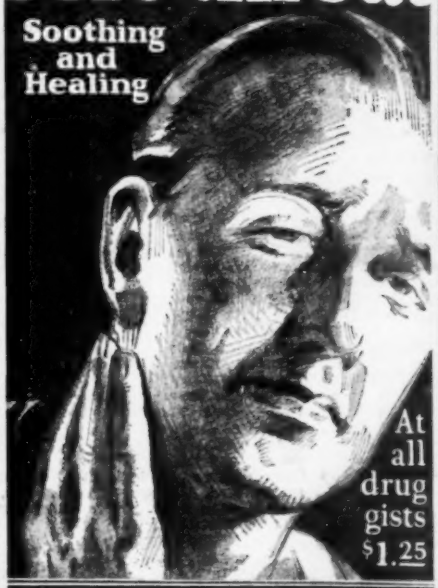

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with the reliable Crown Smoke Preventor built expressly for large industrial boilers by the country's foremost combustion engineers—separate type for each boiler.

CROWN SMOKE PREVENTORS

are comparatively inexpensive yet absolutely eliminate smoke and make a worthwhile coal-saving. Our engineers give full directions for installing—ordinary steam-fitter can handle job. Write for folder S12. Distributors wanted.

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YOUR CHRISTMAS TREE

should be crowned with the new

ELECTRIC ANGEL-CHIME

Made of brilliant nickled metal, eight in. high, six angels uphold three differently tuned bells. Plug in on any 110-120 volt tree light set. Glistening Star of Bethlehem or any regular tree light bulb revolves at top of tree.

All Assembled Guaranteed Safe No Heat **$1.50** Postpaid

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A successful shave is made up of three things—

a good brush,
a good lather,
and a good razor.

We will supply the first requirement with a

WHITING-ADAMS

Vulcan
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The other two are up to you. This famous name on a shaving brush is a guarantee that you are getting a good brush.

Brush Makers 118 Years

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This and many others in my new book. Building Plans for Modern Homes, will save you hundreds of dollars. One of the most complete and comprehensive books of plans ever published by any architect. New edition just off the press. Nearly 600 floor plans and photographs of Colonial houses, bungalows, etc., costing from $200 up; gives sizes and cost to build. Sent postpaid for $3.00.

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Which color do you want?

Send dealer's name and 20c for 40c sample of waterproof Valspar-Enamel. Red—*light, deep*, Blue—*light, medium, deep*, Green—*medium, deep*, Ivory, Yellow, Orange, Gray, Brown, Black, White. Valentine & Co., 450 4th Ave., New York.

NEW! A BIG HIT!

The Little Checkwriter with the Big Protection

$12.50 THAT MAKES THOUSANDS SAFE

Salesmen!

At last! A checkwriter at everybody's price! Sells for $12.50. Does more than larger machines costing hundreds! Our salesmen cleaning up!

The Arnold Features

1. Pocket size convenience.
2. Handsome nickel plated aluminum.
3. Light weight. Easy to operate.
4. Prints and cuts characters in acid proof ink.
5. Unlimited capacity. Low cost. Easy to ink.
6. Guaranteed for 5 years. Nothing to get out of order.

FREE SAMPLE OFFER! Salesmen! Here's the biggest selling proposition of the year for you. Wonderful opportunity with very liberal commissions to district managers and salesmen.

THE ARNOLD CHECKWRITER CO., Inc., Dept. 18
FLINT, MICHIGAN

ST. LOUIS

211 Different Kinds of Industries

St. Louis has factories in 211 different kinds of business. Almost every line of manufacture is represented. Only eight per cent of the city's industrial force is employed in its largest branch of industry.

This wide diversity of industries acts as a constant balance and makes St. Louis strong in times of business depression. It assures stability of labor and production.

There is a westward trend of industry. Modern business is moving toward the center of the country. This has resulted in ***196 new industries*** coming to St. Louis in the last six years. The central location of St. Louis makes it an economical distribution point. ***Your*** factory in St. Louis would have a distinct advantage over competitors not so favorably located.

Send for our booklet "Why St. Louis Grows." It tells the full story.

Address Dept. 33

ST. LOUIS
CHAMBER OF COMMERCE
ST. LOUIS, U.S.A.

MORE Heat

The CROWN Fuel Saver will give *more heat, intenser heat,* than you ever before succeeded in getting from a given amount of coal—and will lower your coal bills.

CROWN FUEL SAVER
mixes **RED HOT OXYGEN**
WITH GASES OVER FURNACE FIRE BED
SAVES 20% *of* FUEL

You can have the cosiest, warmest home this winter by simply attaching the Crown Fuel Saver to the feed door of your heating plant.

By doing so you will save at least 20% of the coal you usually pay for—get decidedly more heat from the coal you burn—reduce the number of firings—and keep every room livable and comfortable.

The CROWN Pays for Itself

in comfort alone—in healthful heat that conquers cold and dampness. The Crown pays for itself in actual money. For, we absolutely guarantee the Crown to save at least 20% of the coal you ordinarily use, or we will refund its purchase price without argument.

A 20% coal saving is big enough to make it worth while for you to investigate the inexpensive Crown Fuel Saver.

Proved by 11 Years' Use

The Crown Fuel Saver has proved its merit as a coal-saver and heat producer in thousands of homes, apartments and factories. Write today for full description and for special low price of Crown with money-back guarantee. Do it today. You'll be lots more comfortable this winter with a Crown on your heating plant—and you'll make a substantial money-saving.

CROWN FUEL SAVER CO.
412 N. 10th St. RICHMOND, IND.

DISTRIBUTORS WANTED—The Crown Fuel Saver and the Crown Smoke Preventor for industrial power plants offer a worthwhile opportunity for ambitious men. These devices cover every need in the home and industrial heating field. Write for details of our exclusive territory franchise.

$351.00 CLEARED ~ IN ONE DAY

So writes W. H. Adams of Ohio in August 1925. V. A. Marini of California reports **$11275** sales in three months. Jacob Gordon of New Jersey **$4000** profits in two months." Alexander of Pennsylvania "**$3000** profits in four months." Ira Shook **$365** sales in one day. Bram bought one outfit April 5 and 7 more by August 28. Iwata, bought one outfit and 10 more within a year. Mrs. Lane of Pittsburg says "sold **8000** packages in one day. J. R. Bert says "only thing I ever bought that equaled advertisement." John Culp says: **"Everything going lovely.** Crispette wrappers scattered all over town. It's good old world after all." Kellog, **$700** ahead end of second week.

WE START YOU IN BUSINESS

Furnish secret formulas, raw material, and equipment. Little capital required; no experience needed.

Build a Business of Your Own

No limit to the sale of Crispettes. Everybody likes them. It's a delicious food confection. Write for facts about a business that will make you independent. Start now, in your own town.

Profits $1000 a Month Easily Possible

Send postal for illustrated book of facts. It contains enthusiastic letters from others—shows their places of business, tells how and when to start, and all information needed. Free. Write now!

LONG-EAKINS COMPANY
1228 High Street Springfield, Ohio

A SCHOOLBOY CAN NOW "KEEP BOOKS"

Bookkeeping troubles made so easy with a So-Easy Loose Leaf Outfit. Binder, 200 sheets ruled to use in your business, A-Z index. Price $3.00. **SPECIAL for 10 Days.** Send $2.50 for book. I will include samples of 60 stock forms and "How to Find Errors in Trial Balances."

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Plumbing and Heating Supplies

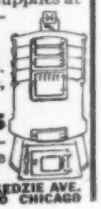
Bath Room OUTFITS COMPLETE $58.25 UP

INSTALL THEM YOURSELF

Full line of plumbing and heating supplies at big savings. All made of finest materials brand new and perfect.

EVERYTHING GUARANTEED

Hot water and steam heating plants. **Water supply systems.** Radiators, fittings, etc.



HOT WATER PLANT 700 ft. Rating **$71.15**

Send us sketch of your rooms for estimate or tell us your wants. **Price list on request.**

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You can make $100 a week

Yes, you can make $100 a week. You can do as well as H. T. Pearl who made $750 in one month. You can begin like R. L. Marshall who made $80 in five hours. You don't have to invest any money. Experience is unnecessary—yet you can start right in to make big money. In a short while you can enjoy an income of $5000 a year for the easiest, most pleasant and fascinating work you ever did.

HUDSON Coach

Hudson Coach GIVEN!

We want men and women to represent us everywhere. Wonderful plan. 350 Household Necessities direct from factory to home. Spare time or full time returns amazing profits for easy work. We furnish everything you need to start. In addition to big earnings we offer you a brand-new Hudson Super-Six Coach. Write at once for details of this money-making proposition. We'll send FREE PROOF that you can make $100 a week in this pleasant, dignified, permanent business.

Write quick for details

The American Products Co. Dept. 5649 Cincinnati, Ohio.

Agents—Just Out!

NEW AMAZING INVENTION

One device makes window washing 75 per cent easier. Washes, drys, polishes windows in a jiffy. Every housewife wants it. No more ladders to climb, no mussy rags nor sponges to wring. Hands never touch water.

Make $90.00 a Week Easily Quickly

Sells fast. Simply show it and take orders. Make 100 per cent Profit. No experience needed. We show you how. Send for Catalog of this and 47 other Quality Rubber Products. Direct from Akron, the Rubber City. FREE Outfit to hustlers. Write quick.

Kristee Mfg. Co., 412 Bar St., Akron, Ohio

Print Your Own

Cards, stationery, circulars, tag, labels, paper. **Complete Outfits, $8.85 up,** Job Presses $11 up, Rotary $149. Card Cutters, $3. Save money. Print for others, big profits. All easy rules sent. Write for catalog presses, type, paper cards, ink etc. **THE KELSEY CO., H-37, Meriden, Conn.**

M-m-m! TENDER STEAK

- Meat Tenderer
- Mince Knife
- Cleaver
- Ice Tool
- Food Chopper
- Fish Scaler
- Nut Crumbler

Ideal Fiber Cutter tenders meat to juicy tastiness. Housewives all say, "Just what I want." Tested and Approved by Good Housekeeping Institute. Two minute demonstration sells it.

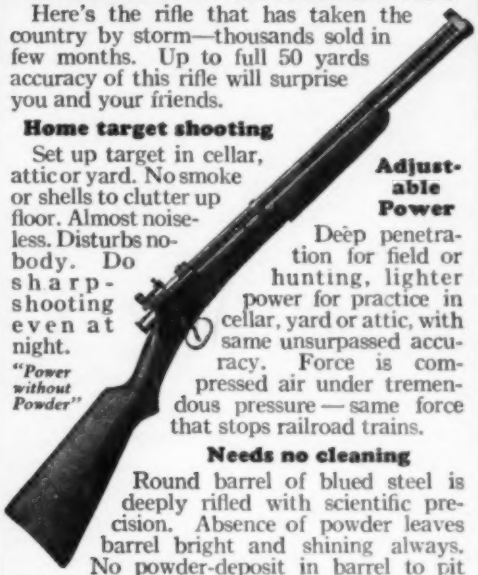
AGENTS • Year 'Round Seller

This handy kitchen aid has no dull season. Needed every day. 100 per cent Profit. Agents make $8 to $20 a day. **Boorem, Pa., writes. "Made $25 clear profit today."** You can do as well. Work spare or full time. Our time-tested sales plan shows you how. Write for details at once.

THE TYLER MFG. CO., Dept. M-6, Muncie, Ind.

Outshoot your friends with a Crosman Pneumatic .22

Here's the rifle that has taken the country by storm—thousands sold in few months. Up to full 50 yards accuracy of this rifle will surprise you and your friends.



Home target shooting

Set up target in cellar, attic or yard. No smoke or shells to clutter up floor. Almost noiseless. Disturbs nobody. Do sharp-shooting even at night.

"Power without Powder"

Adjustable Power

Deep penetration for field or hunting, lighter power for practice in cellar, yard or attic, with same unsurpassed accuracy. Force is compressed air under tremendous pressure — same force that stops railroad trains.

Needs no cleaning

Round barrel of blued steel is deeply rifled with scientific precision. Absence of powder leaves barrel bright and shining always. No powder-deposit in barrel to pit rifling or impair flight of bullet. You can pick off small game one after the other without startling other game nearby.

Economical Bullet is spool-shaped, ungreased, with rounded nose. Five shots for a penny—one-third the cost of .22 powder cartridges.

A Real Gun The Crosman is 35 inches long; weighs 5½ pounds. Knocks down to fit suitcase; only one screw to remove. Heavy solid walnut stock with pistol-grip and steel butt-plate give excellent balance; handles just like any high-grade rifle and is the pride of expert riflemen.

Order Now Crosman Pneumatic rifle $15 (West of Rockies $17.50)—Bullets, per 1000, $2.25 (West of Rockies $2.40)—target holder with bell attachment $2.00—Paper targets 50c per 100—lined gun case $2.25—all prepaid. Go to your dealer. If he cannot supply you, send check or money-order.

Crosman Arms Company, Inc.
469 St. Paul Street, Rochester, N. Y.
Canadian Address: 70 W. King St., Toronto
Dealers: Write for proposition.

Fastest Cutting

Saws Fifteen Cords a Day!

ONLY $39

Men— Let Me Send You My Greatest LOG SAW Offer!

It's easier now than ever before to own this fastest-cutting, easiest-moved, most powerful Log Saw. Now, you can make big money sawing firewood, stave-bolts, ice, shingle timber, etc. Write today for full details of this most wonderful offer. Know how easy it is to make big money sawing fifteen cords of wood a day with no hard work.

350 Saw Cuts a Minute— nearly six each second. Just think of it—now you have a log—in a few seconds it's all sawed up into lengths you can use—without any hard work! The OTTAWA has balanced crank shaft, power force feed, friction clutch.

Make BIG MONEY— Wood selling at $3 a cord brings owner $45 a day. Saw your own wood—go into the wood business. Don't let the lack of ready money stop you. Remember, we sell on very easy terms. More in use than all others combined.

Puts the OTTAWA Working for YOU!

I average $20 profit a day with my OTTAWA."—J. Schill, New York. "My OTTAWA has earned $700 for me."—S. Graham, Wisconsin. "I can make more money with the OTTAWA than by farming."—D. Goff, Missouri.

OTTAWA 4.H.P. LOG SAW

30 Days to Try—one whole month to use the OTTAWA at your own sawing. Shipped on trial only—backed by 10-year guarantee. Prove to yourself how easy you can saw 15 cords or more a day—at a cost of 1½ c a cord.

To Save You Freight—and get your machine to you a few days after you order, I ship from: Ottawa, Kan.; Pittsburgh, Pa.; St. Paul, Minn.; Albany, N. Y.; Memphis, Tenn.; Indianapolis, Ind.; Pueblo, Colo.; Ft. Worth, Texas; Portland, Ore.; San Francisco, Cal.

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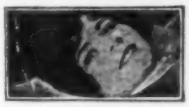

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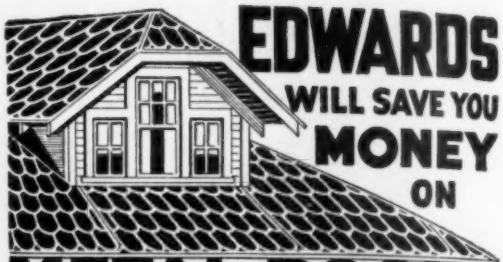

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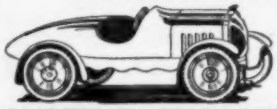

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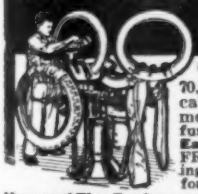

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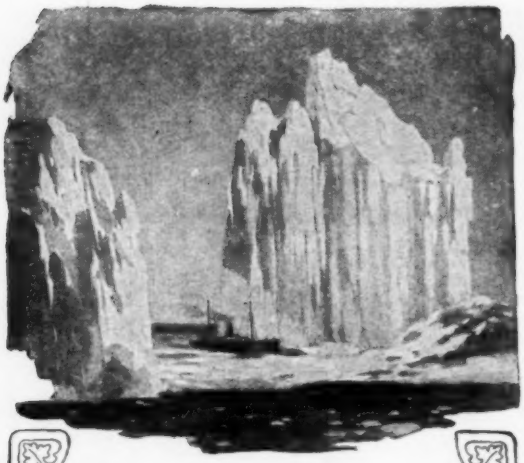

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The pleasure of watching the bright, flowing solder, plug a hole or mend a break is only exceeded by the satisfaction of knowing you have done something useful.

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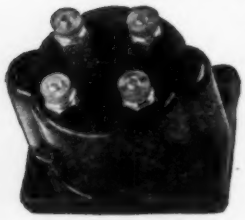

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ON ALL STANDARD MAKES

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Our big illustrated catalog sent *free and without obligation* to buy. Write for yours today.

Young Typewriter Co., Dept. 110-C 654 W. Randolph St., Chicago, Ill.

RADIO DEALERS

SET BUILDERS!

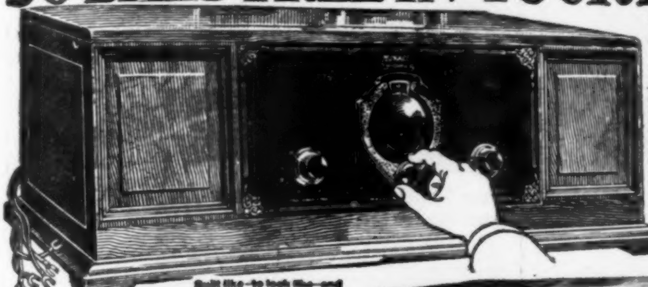
Get the new 1926-27 Van-Ashe Catalogue.

Shows all latest hook-ups with diagrams; also every part needed in building any set. It's a complete set-builder's catalogue and hand-book. Sent for 25c coin or stamps.

Van-Ashe Radio Co.

206 North 10th ST. ST. LOUIS, MO.

30 DAYS FREE IN YOUR HOME



Built like—to look like—and perform like $200 sets

Send Coupon for Amazing Special Offer!

NOTE: This offer is made to prospective buyers by famous big Radio Corporation, one of America's oldest reliable manufacturers of fine sets—seventh successful year. Many satisfied users in every state. Postal or coupon brings testimony of nearby users and proof Miraco's outperform sets costing up to 4 times as much. Very easy to install and operate.

AMAZING SPECIAL OFFER to User-Agents who will allow friends to listen to their Miracos.

Tested and approved by all of Radio's Highest Authorities

BEAUTIFUL-BIG-POWERFUL Ultra Selective MIRACO Ultra 5

Retail LIST Price $49.75 now only

GET SPECIAL OFFER

One year GUARANTEE

Real Single Dial Control!

Magnificent Big Powerful Miraco "Unitune-5" Get Special Offer and Amazing Low Price!

The celebrated Miraco Ultra-5—U.S. Navy type circuit, has also been adapted to Single Dial Tuning—**without sacrifice of selectivity, volume, clearness, power, tone, or distance getting qualities!** In the magnificent big Miraco Unitune-5, above shown, you turn one vernier knob for stations everywhere. Beautiful **hand-rubbed, piano hinged, solid walnut cabinet,** 28 in. long, 15 in. deep, 10 in. high. Sloping Bakelite panel is walnut finished to match. **Also offered on 30 days free trial!**

Coast to Coast and Foreign Reception Certified by Miraco users

MIRACO RADIO GETS 'EM COAST to COAST

Send for Proof!

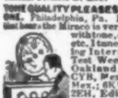
Notice! Enormous sales of the celebrated Miraco big fine Receivers (resulting from delighted users so highly endorsing them to friends) again enable us to add hosts of costly new features, latest refinements and up-to-the-minute improvements such as you might expect to find only on much higher priced sets. Miraco's this year are still better—more beautiful—more selective—more powerful for less money than ever before.

USER-AGENTS WANTED - - WRITE!

Reports from users everywhere leave little for us to add. These are only a few of the many in our files and which we receive daily. Send coupon for plenty of additional proof and testimony of nearby users.

HAS NO EQUAL FOR TONE, VOLUME, DISTANCE. North Wildwood, N.J. Miraco best packed set I ever saw shipped. Words cannot express the wonderful tone quality volume, and distance. First night received 47 stations on Loudspeaker. Up to last night, the 5th day, I have received exactly 103 stations; farthest is KGO, Oakland, Calif. on loudspeaker. Also Porto Rico, Cuba and Canada. Francis B. Lee.

TONE QUALITY PLEASES EVERYONE. Philadelphia, Pa. Everyone that hears the Miraco is very pleased with tone, distance, etc. I tuned in during International Test Week: KGO, Oakland, Calif.; CYB, Mexico City, Mex.; 6KW, Cuba; 2EH, Edinburgh, Scot.; also a station in Buenos Aires, Argentine. Geo. W. Hill, Jr.



WISCONSIN HEARS COAST TO COAST. Racine, Wisc. I got station 2LO London last Wednesday night on my Miraco. Heard a choir sing and announcement. Have also heard PWX, Havana, Cuba; CYZ, Mexico City and 104 American stations from coast to coast. Lawrence Risberg.

SELECTIVITY!—CUTS THROUGH STRONG LOCALS. Detroit, Mich. I am more than satisfied with my Miraco. I can cut through WWJ, WCX, WJR, WGHP, very strong local stations, and this is done with quarter of a turn. In every way it is simply perfect. Charles Paul.

UTAH ENJOYS COAST TO COAST PROGRAMS. Heber City, Utah. The Miraco sure can't be beat at any price. Coast to coast it sure does and more. I have had stations in New York and Cuba in the east, and scores of other stations on the west coast. I have logged up to date 150 stations and they all come in wonderfully. Monte Giles.

MIRACO WINS AGAINST 3 OTHER MAKES. Pearland, Texas. I tried three other makes and the Miraco is the best of them all. Received KFI, Los Angeles, Calif. on loudspeaker. O. H. Richards.

Nacogdoches, Texas. On my Miraco I have heard stations from Cuba to San Francisco and from Mexico City to Pittsburgh. Walter M. Frisbie.

COAST TO COAST LOUD AND CLEAR. Guthrie, Minn. We logged over 30 stations and got over 1500 miles on the loud speaker the first night—our first experience tuning a radio. The third night we got WJAX Jacksonville, Florida and KFI Los Angeles, Calif., on the loudspeaker. Neighbors say Miraco is the best they have ever heard. O. R. Wolf.

MIRACO BEATS A SUPER EIGHT. Cobalt, Ontario, Canada. Miraco is one of the best radios in all the north country. There is a man here who has a big Super eight and our Miraco beat it. W. Sounder.

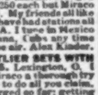
OUTPERFORMS SOME $300 SETS. Blakely, Ga. I am well pleased with my Miraco. It does better than machines that cost $300 or more. J. D. Thom.

MOST SELECTIVE—SUPERIOR TO $120.00 SET. Santa Cruz, California. I do not hesitate to show my friends the "Miraco Superiority" over my (names another set) costing $120.00. The Miraco is the most selective set I have seen yet and cuts out the jumble of stations on the low wave length in 1 1/2 points. Wm. Schuette.

MELLOW TONE—LOUD AND CLEAR. Indian River City, Fla. A wonder set. Am having splendid results. Have had Miraco four nights and have stations on my list from Cuba to New York, Chicago, Denver, Texas, all coming in loud, mellow in tone and clear. I have one sold already and did not even try. Mr. H. G. Duff.

REFUSED TO TRADE IT FOR EXPENSIVE SET. Prosper, Ore. Over 31 stations brought in first night on loud speaker. I ordered the Miraco for a friend and he is more than pleased. I offered to trade my Neutrodyne for it but he refused and it has the name of the best set in the community. M. E. Hulton.

PENNSYLVANIA BEGINNER GETS 'EM ALL OVER. Corry, Pa. Have had Miraco one month today and have received over 115 stations from all parts of the United States, Canada, Cuba and Mexico. I think this is pretty good for one that never had any experience before. Clarence Drugfelder.



LIKES IT BETTER THAN $150—$250 SETS. Westville, Ill. Miraco sure is a wonderful set. I get the stations easily without noise—that's one of the things I like about the Miraco. I've had three other sets that have ranged from $150 to $250 each but Miraco beats them all. My friends all like the Miraco. I have had stations all over the U.S.A. I tune in Mexico City and Havana, Cuba any time they are on the air. Alex Kinder.

BEATS COSTLIER SETS WITH MORE TUBES. Lexington, O. I have given Miraco a thorough try out and find it to do all you claim. 85 stations logged so far; getting new ones every week. This list includes coast to coast, Canadian, Cuban and Mexican stations. **The selectivity is remarkable.** Others here in town have more expensive and elaborate sets with more tubes but do not ever do this. Fuller Temple.

MIRACO OUTPERFORMS THEM ALL. St. Francis, Kansas. I've heard a lot of radios but the Miraco is best all around. I am proud of mine. Comes in fine and clear. No noises. Get lots of distant stations. Surely am satisfied. Orvey Sharpe.

Big Powerful New MIRACO

TRADE MARK REGISTERED

Solid Walnut Cabinet — Unitune 5 — 28 in. long

Solid Walnut Cabinet — Ultra 5 — 27 in. long

ULTRA-SELECTIVE LONG DISTANCE 5 TUBE SETS EASY ON BATTERIES

Unless Trial Proves Your Miraco the Most Selective, Clearest Toned, and Most Powerful Distance Getter—Don't Buy it!

No need to wear out expensive batteries burning 6, 7 or 8 tubes when users everywhere are reporting that the big latest Miraco 5-tube sets actually are *unsurpassed* (even at much higher prices) for razor-edge selectivity, extreme long distance reception, clear natural tone and powerful loud speaker volume combined with great economy in use of battery current! Enjoy a powerful Miraco 30 days in your home—*at our risk*—and be convinced! Your verdict final—absolutely no strings to this. *Save or make a lot of money* on sets and accessories this season by sending **IMMEDIATELY** for our *Amazing Special Offer!*

Deal Direct with a Big Reliable Corporation

Remember this offer is made direct to you by a big responsible manufacturing corporation—one of the oldest and most successful set-builders in the industry—a concern which has grown to immense size thru recommendations of its many thousands of satisfied customers who bought after trial.

Our Factory Prices Save You Up to One-Half

We deal direct by mail with users, agents and dealers, thereby effecting great savings which are reflected in amazingly low prices. *Everything we sell is high-grade. Don't confuse Miraco's with small, cheap sets.*

You'll be Proud of Your Miraco

In its big, handsome, expensive-looking solid walnut cabinet with sloping front, you'll be proud to have friends examine and hear your Miraco. In construction, appearance and performance, every inch a high-priced set. Handsomely gold illustrated genuine Bakelite front panel and genuine Bakelite knobs—finished in grained walnut. Finest parts obtainable—the kind used in $200 sets. Bakelite sub-panel. *Many exclusive features.* Each Miraco reaches you completely assembled, rigidly tested, splendidly packed and factory guaranteed for one year. Easy to install and operate—full instructions supplied. Send NOW for testimony of nearby users and *Amazing Offer!*

The Provident Savings Bank and Trust Co's Building

What a $3,000,000 Federal Reserve Bank Says:

"For years the Midwest Radio Corporation of this city have been very satisfactory customers of this Bank, one of the largest in Southern Ohio. The Midwest organization was one of the very first to engage in the manufacture of radio sets, and to us their success is evidenced by the sound and steady expansion of their business which we have observed year after year. We are personally acquainted with all officers of the Corporation and from experiences know them to be men of honor, integrity and ability. We consider them to be both morally and financially responsible. **They have a reputation for fair and square dealings.**" THE PROVIDENT SAVINGS BANK & TRUST CO. Member Federal Reserve System. Capital and Surplus over $3,000,000.

AGENTS! DEALERS! Write for our latest Miraco proposition. Nation-wide popularity, superior performance of Miraco Radio sets, at amazingly lower prices, make them easy to sell. Send coupon today for proof

Midwest Radio Corporation Pioneer Set Builders 7th Successful Year **Cincinnati, O.**

All the Proof you want is waiting for You!

Coupon or postal brings reports from hosts of users in your vicinity and elsewhere proving that Miraco sets **at rock-bottom money-saving factory prices,** outperform sets costing up to four times as much. **You can also buy speakers, tubes, batteries, etc., at big savings from us!** Get our proposition before spending money elsewhere.

Send coupon for Amazing Special Offer!

MIDWEST RADIO CORPORATION
Pioneer Builders of Sets
407-R Miraco Building Cincinnati, O.

Without obligation, send free literature, testimony of users, AMAZING SPECIAL OFFER and full particulars of your **big money-saving factory-price proposition** on Guaranteed Miraco sets and all radio supplies. ( ) Agent ( ) User ( ) Dealer

NAME

ADDRESS

INGERSOLL Wrist Watch

Recently reduced to .. $3.50

New model this year. Tonneau-shape; silvered metal dial. Wrist Radiolite, tells time in the dark, $4.00

For Christmas an *Ingersoll*

When you give an Ingersoll watch you make a gift that is appreciated all out of proportion to its cost. For there's no gift like a watch, nothing used so much, consulted so often, carried so long. And Ingersoll Watches, made for over 30 years, have a reputation for dependability and enduring service that is worldwide and thoroughly deserved.

INGERSOLL WATCH CO., Inc.
New York Chicago San Francisco

The New YANKEE

Recently reduced to $1.50

More closely cased, antique bow and crown, new dial and other new features of grace and beauty. Sturdy and dependable.

2000 RADIO BARGAINS *Here*

The Guide to Radio Prices and Radio Quality Our vast resources and radio experience have been utilized to assemble in one gigantic institution, the best and newest things in radio. The Randolph catalog is the great radio market place—a masterpiece of merchandising that befits our house—

The World's Largest Exclusive Radio Mail Order House

Catalog Contains Over 2000 Items, from the most beautiful, fully equipped console radio set, down to the smallest part or tool, **for the set builder—kits, parts and supplies** of every type and style. All beautifully illustrated and interestingly described. Also valuable data of today's most fascinating and most wonderful achievement—**RADIO.**

Save 1/3 to 1/2

5-TUBE SETS AS LOW AS $24.90—Latest 1927 Models All Randolph sets are sold at amazingly low prices. No matter what kind of set you want—no matter how little you want to pay—you can select YOUR SET AT YOUR PRICE from the Randolph catalog.

WE SAVE YOU MONEY Because we handle radio exclusively and sell a tremendous volume of everything in Radio, we can concentrate our buying power for the benefit of our customers.

SEND FOR BOOK TODAY We cannot begin to tell all about this wonderful Radio Book. Simply send letter or postal and this **bargain catalog** of **guaranteed** radio sets and supplies will come to you **absolutely FREE.**

RANDOLPH RADIO CORPORATION
180 N. Union Ave. Dept. 182 Chicago, Ill.

AGENTS!

EXPERIENCE UNNECESSARY

Science has finally produced it. An instantaneous metal cleaner—neither sloppy liquid nor messy paste. Dry magic floss. Touch it to nickel, copper or brass. The metal shines bright and clean *instantly!* No hard rubbing! Lightning Silver Cloth does same for Silverware, Lightning Furniture Floss instantly cleans and puts high lustre on Furniture. No liquid! Lightning Products all *approved by Good House-keeping Institute.* Agents making up to $30 a day!

AMAZING DISCOVERY ABOLISHES METAL AND FURNITURE POLISH

Imagine! Touch tarnished articles with a Lightning Polishing Cloth or Floss and you make them bright as new. Demonstrations positively astonish! *Every one a sale!* Agents collect *real money* on *every* call.

Makes a Sensational Demonstration!

Everybody Buys These Products. Housewives buy the Lightning Silver Cloth and Furniture *Floss.* Autoists buy Lightning Polishing *Floss.* Sell all three to stores and offices in big quantities. Nothing else like them. Sure big, quick MONEY GETTERS.

Sample Free! Exclusive territory. Real cooperation. Triple profit. Answer this ad at once. Make big money. Easy! Quick! Don't delay. Write NOW! FREE test sample and proposition by return mail.

B. V. LIGHTNING PRODUCTS CORP., 1773 Greenleaf Ave., Chicago

RADIO BOOK FREE

Tells how you can make big money in world's newest and greatest field. Presents lifetime opportunity in Radio. Right now we want live agents and dealers in every locality, $60 to $100 a week easy.

40% TO 60% PROFIT

FREE Simply send name for this big illustrated book explaining liberal profit proposition and how to get latest radio goods at wholesale. Also prices on parts, sets and accessories and amazing special offers—all free. Write today.

STANDARD RADIO CO. 1402 Walnut Street KANSAS CITY, MO.

Be sure You get these CONN FEATURES

R. E. CLARK, solo trombonist U. S. Marine Band, uses a Conn.

EXCEPTIONALLY easy playing; beauty of tone; perfect scale; absolutely dependable mechanism, are features of every Conn instrument for band and orchestra. As world's largest builder of band instruments Conn has developed improvements and patented features which enable you to make faster progress, quick success in a big way. The world's foremost artists use Conns. And Conn features COST NO MORE!

Free Trial, Easy Payments on any Conn cornet, trombone, saxophone -- everything for band or orchestra. Write now for Free literature and details of trial offer: mention instrument.

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FREE 1000 Illustrations **ELECTRIC FIXTURE CATALOG!**

Write today for your copy. Save 50% direct from Manufacturer. No Middleman's Profit. OUR SPECIAL: 8 Room Electric Set, ready to hang, $24.50—Other bargains.

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Papier Mache Deer Head Forms

Ready to attach horns, draw skin over face—have a perfect job. We make forms turned right, left sneaks to fit the north or south deer. Moose, elk, caribou, goat, open mouth rug heads.

New illustrated circular

Papier Mache Specialties Co.
Reading, Michigan

World's Greatest Utility Light Burns Air!

300 CANDLE POWER—with new built-in Utility Pump. Handiest, most practical light invented. Storm-proof, rain-proof, bug-proof. Ideal for city, town, country—indoors, outdoors—anywhere. Bright, white light—20 times brighter than wick lanterns at half the cost. *Burns 96 per cent air—4 per cent fuel*, gasoline or kerosene. Lights with match. Clean, odorless, safe to operate. Guaranteed.

AGENTS! Make $60 to $100 a week. No experience or capital required. Outfit Free to workers. Exclusive Territory. Write quick!

30 DAYS FREE TRIAL Try 30 days at our risk. Send for special money-saving offer and catalog giving all details FREE. Write now.

THE AKRON LAMP CO.
112 Lamp Bldg., Akron, Ohio

Ten Minutes More for Breakfast

And time to smile at the Wife. *If* you shave with Barbasol. Quick, cool, clean. No brush. No rub-in. Try it—three times—according to directions. 35c and 65c tubes.

The Barbasol Co.
Indianapolis Ind.

I enclose 10c. Please send trial tube.

Name .....

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P-M-12-26

For Modern Shaving

Earn a REAL Movie Machine

FOR HOME USE
Write Today for Our Easy Plan
PILGRIM CO., 267 Spring St., Dept. P, Medford, Mass., U. S. A.

Diamonds Here at 60% of Market Price

Free Bulletin lists diamonds as low as $60 per carat, also **Gems of Finest Quality** at higher per carat charges, but proportionately **Low Bargain Prices.** This 3/4 less 1-16 carat correctly cut diamond, a snappy blazing solitaire at $68.50. *This 75 year oldest largest Diamond Banking Firm in all the world* lends money on diamonds. Thousands of unpaid loans and other bargains. Many from big cash deals direct with European Diamond Cutters. Must sell NOW.

$68.50
3/4-1/16 Carat Correctly Cut

WHY PAY FULL PRICES

Costs Nothing to See

Any Diamond sent for absolutely free examination at our risk. No obligation. No cost to you. **Latest Listings—Unpaid Loans. Sent Free.** Describes Diamond Bargains in Detail, gives cash loan values guaranteed. Explains unlimited exchange privilege. **Write today for your copy of Diamond Bargain List.** Use blank below, clip ad and mail.

Name.....

Address.....

Tear out and mail today to— **Joe. De Roy & Sons,** *Only Opposite Post Office* **1951 De Roy Building Pittsburgh, Pa.**

"I MAKE $25.00 A DAY SURFACING FLOORS"

Parr was making $7 a day. Now he's making $25 to $40 a day.

Start in a small way and make big money. That's what Parr did and thousands of others have done. Like you they read an advertisement just like this and accepted the wonderful opportunity to get behind an electrically driven American Universal Floor Surfacing Machine and build up a big profitable business of their own.

They are men from factories, stores, and offices, young and old alike, who were looking for a future and an opportunity to make real money. They are now making from $25 to $40 a day with one American Universal Floor Surfacing Machine which does the work of six men and earns six mens pay. All started with just one machine, but many are now operating six or more machines and have become floor surfacing contractors on a large scale.

EVERY NEW FLOOR MUST BE SURFACED
EVERY OLD FLOOR NEEDS RE-SURFACING

There is surfacing work to be done in every new and old business or residence in your vicinity. If you are willing to don a pair of overalls, you can make from $25 to $40 a day every working day in the year—Winter and Summer, month in and month out.

NO EXPERIENCE NECESSARY

Any intelligent man can learn to operate the electrically driven American Universal Floor Surfacing Machine in a very short time. It actually does in a day the work of six men scraping by hand and does much better work than can be done by hand.

Write now for particulars. Let us tell you how you can become an American Floor Surfacing Machine contractor. You can secure this information absolutely free without any obligation on your part.

THE AMERICAN FLOOR SURFACING MACHINE COMPANY
Originators of Floor Sanding Machines
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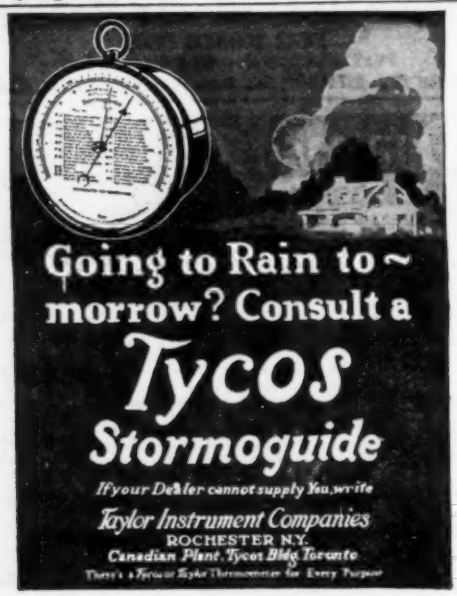

A Motor Boat—*for half the cost!*

The Super Elto clamps on any open boat—gives all motor boating pleasures at amazingly small cost. Powerful, speedy, reliable. Light and portable. Write today for intensely interesting catalog!

The Super Elto

Elto Outboard Motor Co.
Ole Evinrude, Pres.
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"Starts With a Quarter Turn"

GALACITE* will repair a puncture in ONE MINUTE without taking the tire off the wheel or rim; and in addition it will make the tire Puncture Proof for life. GALACITE* seals instantly and permanently, punctures, leaks, porous places and leaky valves. No more flat tires, no more getting out and changing tires in bad weather. No soiled clothes. A scientific laboratory product. Tested in every part of the United States. **Backed by a MONEY BACK GUARANTEE** to do everything we claim. Guaranteed not to injure tube, valve or tire; on the contrary it **preserves and lengthens the life of tube and tire,** often

INCREASING TIRE MILEAGE FROM 10,000 TO 12,000 MILES

Take a hammer and drive as many nails into a tire as you wish, 50—100—500, it makes no difference. GALACITE seals the punctures permanently, as soon as they are made. We guarantee it for one year, but it will last indefinitely.*

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EARN $5,000 TO $10,000 A YEAR

TREMENDOUS PROFITS. Agents and Distributors everywhere to demonstrate and sell to car owners, garages, filling stations. Work all or spare time in your own home town or traveling. **GALACITE*** sells itself. Every customer becomes so enthusiastic that he helps you sell his friends. **A revolutionary invention** that will make you independent. You can also manufacture and sell **GALACITE* PUNCTURE PROOF INNER TUBES.**

ACT QUICK **SEND NO MONEY.** Just your name and address will bring complete particulars by return mail. **Get this information right now.** Test it out. Get started while the field is still uncrowded.

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I Offer You $8.00 a Day and a

Write quick for new proposition. We offer $8.00 a day and a new Chevrolet Coach for demonstrating and taking orders for Comer Suits. Spare time. No experience required. Sample outfit free. Write now.

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A wonderful invention. Keeps cord out of way while ironing. Grips the ironing board. Tested and approved by Good Housekeeping Institute.

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$2000 in Three Months

88c profit on $1 order. Sold by mail 2000 orders in 3 months. Let me send you, free, all ads and letters and tell you how I did it.

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Your Daily Profits $6 to $12

Marvel lamp of all times. Years in advance of others. 300 candle power. Equals safety, brilliancy of electricity, 1-tenth the cost. 20 times brighter than ordinary lamps. Easy to operate. No soot. No smoke. No odor. Guaranteed. No capital or experience necessary. Hixon, Iowa, made $123 in 10 days. Profits paid daily. We deliver and collect. Write for Choice territory and Free Outfit.

Outfit Free

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IF YOU CAN USE AN EXTRA $20.00 BILL

write for this

FREE BOOK

You can save $20.00 in no time by using

SMOOTH-ON No. 1

to do your own household repairing—and in addition you will have that proud "I-did-it-myself" feeling.

Here is what one enthusiast did with two 35-cent cans:—A $25 lamp stand loose in base, two big leaks in heating furnace smoke pipe, loose hammer handle, and three loose hooks in tiled bath room wall were all put into good usable condition at an average cost of 10 cents each for the seven repairs—and $20.00 easily saved over what would have been paid to professional fixers or for new parts.

By using Smooth-On to make dozens of the simple repairs necessary in every home, you can save enough to pay your radio upkeep, buy yourself or your wife a camera, a bull pup or some other pleasure-giving article that you would otherwise hate to spend the money for.

The free Smooth-On Repair Book will show you how an astonishing number of home and automobile repairs are as easy for you to make as for somebody else.

Mail the coupon for a free copy and get Smooth-On No. 1 in 7-ounce or 1 or 5-pound can from any hardware store.

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JERSEY CITY, N. J.

Do it with SMOOTH-ON

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574 Communipaw Ave., Jersey City, N. J.

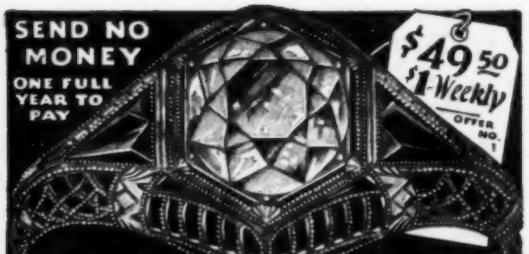
Please send the free Smooth-On Repair Book.

Name .....

Address .....

Return this coupon for a FREE copy of Booklet

SEND NO MONEY
ONE FULL YEAR TO PAY



$49.50 $1 Weekly
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We Deliver and Trust You

Again country's foremost diamond merchants lead in startling offers. Look over these bargains, at almost unbelievable low prices. Read descriptions. Your opportunity to secure the gem you longed for. **Easy Terms**—lower than cash prices.

Your Guarantee

We have faithfully served the public for nearly 100 years. Make your selections. Our **money back guarantee** fully protects you. Order from this ad. on **10 days' free trial.**

Send No Money Now!

Keep your money in your pocket. Select the gem you want and wear it for 10 days. **No. 1**—Ladies' 18 kt. white gold ring, genuine blue white diamond, $49.50—**$1 weekly. No. 2**—Ladies' 18 kt. white gold ring, blue white diamond, blue sapphire at each side, $59.50—**$1 weekly. No. 3**—Ladies' friendship ring, 18 kt. solid white gold, 3 snappy, genuine blue white diamonds, 4 blue sapphires, $53.50—**$3.50 monthly. No. 4**—Gents' 18 kt. solid white gold, genuine blue white diamond, $69.75—**$4.65 monthly. No. 5**—Ladies' 14 kt. solid white gold wrist watch, 15 jewels, 2 genuine diamonds, 4 blue sapphires, $38.25—**$2.50 monthly.**

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Contains up-to-the-minute gift suggestions at startling low prices and very liberal terms—write for a copy now!

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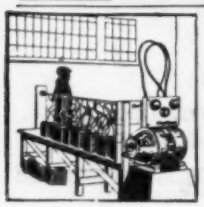

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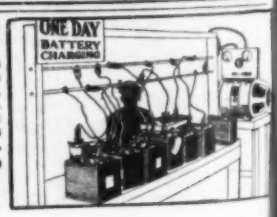

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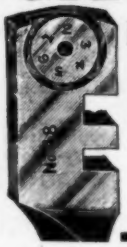

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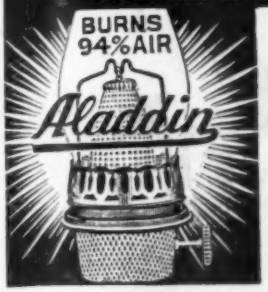

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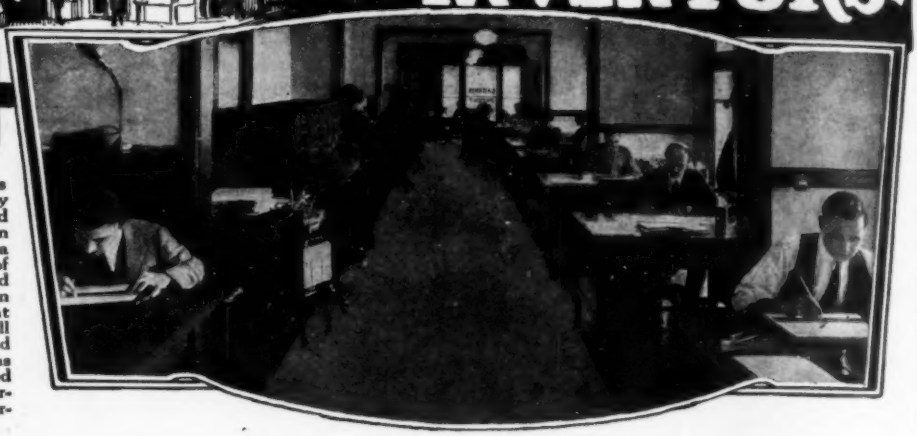

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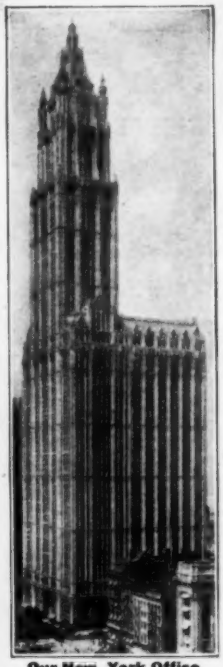

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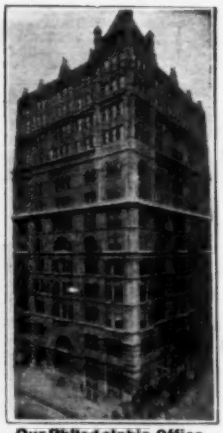

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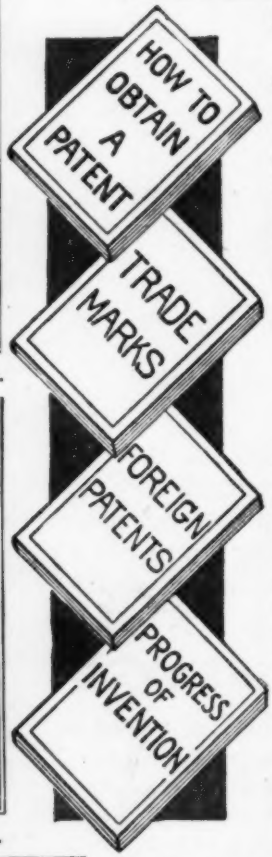

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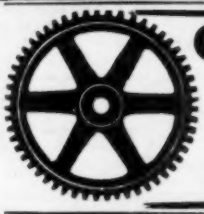

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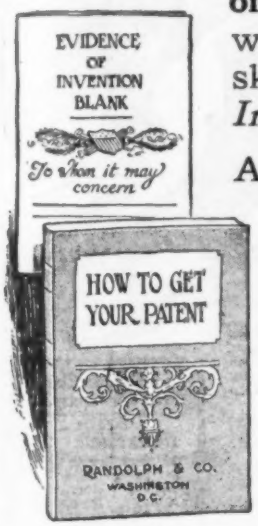

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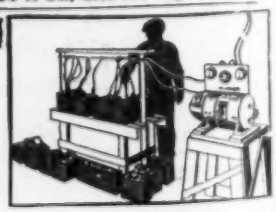

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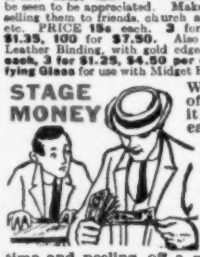

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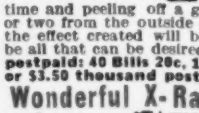

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These clever locks cannot be opened unless you know the combination. No key necessary. For your locker, bicycle, tool chest, mail box, thousands of uses. Shackle and tumblers nickel plated. Weighs trifle over one ounce. Small, yet strong. Secret and full instructions with each lock. **PRICE 25c or 3 for 65c postpaid.**

Every Boy His Own Toy Maker

Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Paddle Raft, a pair of Skis, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages, 150 illustrations. **PRICE, 10c postpaid; 3 for 25c postpaid.**

INVISIBLE INK

The most confidential messages can be written with this Ink, for the writing **Makes No Mark.** Cannot be seen unless you know the secret. Invaluable for many reasons. Keep your postals and other private memorandums away from prying eyes. Great fun for playing practical jokes. **Only 15c a Bottle; 3 for 40c.**

REAL PISTOL — Miniature Watch Charm Pistol

Shoots Blank Cartridges

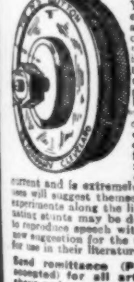
Exact reproduction of a real pistol; actually fires Real **BLANK CARTRIDGES** of miniature size. Illustration is actual size. 1¼ inches long, with ring at end for attaching to watch chain. Loads like a regular pistol. Pull the trigger and it goes off with a loud bang. Pistol is break-open type; illustration shows position for loading. Made entirely of high grade steel, nickel plated, octagon barrel, handsomely engraved handles, complete in box with cleaning rod. **PRICE $1.75.** Also furnished with **pearl handles, $2.50. BLANK CARTRIDGES, 50c** per box of **25. JOHNSON SMITH & CO., Dept. 801, RACINE, WIS.**

RESURRECTION PLANT

One of the most wonderful plants known. Possesses the strange power of turning in a few minutes from an apparently lifeless, dry herb to a **BEAUTIFUL LIVING FERNLIKE PLANT** of a dark green color. Simply place the plant in saucer of water, it will open up and start to grow in 20 minutes. When taken out it will dry up and go to sleep until placed in water again. Fine house plant—summer or winter. **10 cents each or 3 for 25c., 75c per doz., postpaid.**

Microphone Transmitter Button

$1.00 POST-PAID



You can easily make a highly sensitive detectophone by using this Transmitter Button to collect the sound waves. You can build your own outfit without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. This outfit was used by secret service operatives during the war. It is being used on the stage. It is ultra-sensitive and is the greatest invention in micro-phones. You can mount the button almost anywhere—card board boxes, stove pipes, stiff calendars, on the wall behind a picture frame, etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to renew telephone transmitters; often makes an old line "talk-up" when nothing else will. The ideal microphone for radio use: carries heavy current and is extremely sensitive. Amplifies radio signals. Countless other similar uses will suggest themselves. Experimenters find the Button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to reproduce speech without sound waves. $5.00 is given to anyone who sends in a new suggestion for the use of the Button providing the manufacturers find it suitable for use in their literature. **PRICE $1.00 POSTPAID ANYWHERE.**

MAGICIAN'S OUTFIT

Apparatus and Directions for a Number of Mysterious Tricks Enough for an Entire Evening's Entertainment

ANYONE CAN DO THEM 75c

It is great fun mystifying your friends. Get this Conjurer's Cabinet, and you will be the cleverest fellow in your district. It contains the apparatus for seven firstrate tricks, including The Disappearing Rose, that, when placed on the lapel of your coat, vanishes from sight at will; the Magic Vase and Ball Trick (a Wooden Ball is placed inside, and upon replacing the lid has disappeared and is found in someone else's pocket); The Magic Nail with which you can apparently cut your finger almost in two; the Wonderful Card Trick (a card is placed in an envelope, and when open an entirely different card altogether is found); The Disappearing Coin Box a coin is placed in the little wooden barrel, and, when opened again, is found to have vanished entirely, or can be made to change into a coin of another denomination); The Famous Dissolving Penny Trick; The Glass Goblet and Vanishing Coin Trick (a coin is dropped into a glass of water, and when the water is poured out the coin has vanished). With the tricks described above we send full printed instructions for performing each trick, so that anyone can readily perform all the tricks to the great amusement of their friends or the public. Any boy of ordinary intelligence, with this Cabinet of Tricks in his possession, can give a parlor entertainment not inferior to some regular magicians. Besides the tricks contained in the Cabinet, there are many other feats and illusions fully explained with full printed instructions, for which you easily make or procure the necessary apparatus. This unexcelled Cabinet of Tricks for **ONLY 75 CENTS POSTPAID TO ANY ADDRESS.**

Great Fire Eater

Most Sensational Trick of the Day!

With the Fire Eater in his possession any person can become a perfect salamander, apparently breathing fire and ejecting thousands of brilliant sparks from his mouth, to the horror and consternation of all beholders. Harmless fun for all times, seasons and places. If you wish to produce a decided sensation in your neighborhood don't fail to procure one. We send the Fire Eater with all the materials, in a handsome box, the cover of which is highly ornamented with illustrations in various colors. **Price** of all complete only **30 cents,** postpaid.

SQUIRT ROSE

25c

A REAL STARTLER. This is the most popular of all squirt tricks. The flower in your coat looks so fresh and sweet that everyone is tempted to inhale the delightful perfume. Then is the moment to press the bulb. Geewhillikens! Don't they jump? There is a very long rubber tube that easily reaches to the pocket of your coat or trousers, and the bulb is large enough to make a dozen shots with one loading. **PRICE 25c** *each, or* **3** *for* **65c** *postpaid.*

PISTOL, OPERA & FIELD GLASS

PRICE POSTPAID, **$1.00**

It is made in the shape of and looks like a regular Automatic Pistol. No one is likely to stop and ask you whether it is real or not. Thus it is likely to prove itself very handy in an emergency. On pressing the trigger it opens up, as shown in the illustration at the right, revealing nine most useful articles—Opera and Field Glass, Telescope, Mirror, Magnifying Glass and Burning Lens, Reading Glass, Sun Dial, Sun Compass, etc. In the handle of the revolver there is a place for various pocket necessaries, such as First Aid Articles, Buttons, Pins, etc. The Pistol is of sheet metal, blued finish, that can be carried comfortably in pocket. **PRICE $1.00.**

SURPRISE MATCHES

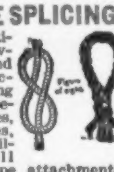
More fun than fighting with your wife. Look just like ordinary matches. Put up in boxes just like regular Safety Matches. As the victim tries to light one he gets quite a surprise. **PRICE 10c per box, 3 boxes for 25c, or 12 for 75 cents.**

10c

SEEBACKROSCOPE

By merely placing this clever instrument to your eye, you can see what is going on behind your back, and sometimes you see very interesting things when no one thinks you are looking. Why it is just like having eyes at the back of your head. **PRICE ONLY 25 cents, postpaid, 3 for 50 cents.**

NEW BOOK ON ROPE SPLICING



A most practical handbook giving complete and simple directions for making all the most useful knots, hitches, rigging, splices, etc. Over 100 illustrations. All about wire rope attachments; lashing, blocks, tackles, etc. 37 Heraldic Knots illustrated. Of great value to mechanics, riggers, campers, boatmen. **Price 20 cents postpaid.**

The "Little Giant" Typewriter

A First Class Writing Machine For $1.50

A perfect little typewriter for $1.50. There are thousands of persons who would like to use a typewriter but whose needs and business do not warrant the expense attached to the purchase and use of a fifty or seventy-five dollar machine. To such persons we confidently recommend our Little Giant. It is strongly made, but simple in construction, so that anyone can quickly learn to operate it, and write as rapidly as they would with pen and ink. The letters of the alphabet most frequently used are so grouped as to enable one to write rapidly, the numerals 1 to 10, and the punctuation marks being together. With this machine you can send your best girl typewritten love letters, address envelopes, make out bills, and do almost any kind of work not requiring a large, expensive machine. With each typewriter we send a tube of ink and full printed instructions for using the machine. **Price complete $1.50 by mail postpaid to any address in the world.**

Send remittance (Postage Stamps accepted) for all articles listed on above and previous page to

JOHNSON SMITH & CO. Dept. 801 Racine, Wis.

Play a Tune

in 10 Minutes!

No Knowledge of Music Necessary
No Tiresome Practice

Now you can pick up your favorite stringed instrument and play a tune almost instantly, even if you don't know one note of music. These wonderful Ferry E-Z Player Instruments take all the work out of learning to play. No expensive lessons. No complicated musical signs and symbols. Play by numbers instead of notes (or by notes if you wish). Just press the numbered keys and you are playing tunes. Hundreds are playing Ferry E-Z Player Instruments who could never learn the old way.

Amazing New Invention

This is not merely a system of instruction—it is a new device invented by a musician that revolutionizes stringed instrument playing. Ferry E-Z Player Instruments give clearer, truer tones, are easier to finger and anybody can play.

Famous Vaudeville Star, Trixie Friganza, writes: "I learned to play a tune in 3 minutes and had never touched a stringed instrument before." John Matise wrote: "Played tunes on Guitar the same day and am delighted. Anyone can play." Leonard Cleary: "In only a few days I have had my money's worth in fun. It certainly is one fine instrument."

Send for FREE Book Tells all about new Ferry E-Z Player "Instruments and how you can play in 10 minutes. Also Free Catalog of special bargains in musical instruments. No obligation. Send for this Free Book now! Your friends will be astonished at your learning to play so quickly. You will be popular and always sure of a good time. Send coupon today.

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What is your favorite stringed instrument? Send for this Free Book, and choose the one you would like to play. You can play it in 10 minutes! Send coupon now!

FERRY & Co. Dept. 1779, Chicago, Ill.

Send me Free Book on Ferry E-Z Player Instruments and tell me how I can play tunes in 10 minutes. No obligation.

My favorite stringed instrument is a .....

Name .....

Address .....

City .....State.....

Leonard Banked $218.00 in Two Days

Think of it, $218.00 profits in two days supplying Ford owners with the most amazing gas saving device of this age, the Weeks' Super Carburetor.
You can always interest the Ford owner when you show him how to save gas. They will buy "in a jiffy" when you demonstrate the "Super" to them and show them how they can make their

Ford Run on 8c Gas

Not only does the "Super" cut gas consumption to a fraction, but it also eliminates carbon, creates amazing pick-up, instant starting, quiets Ford motors, stops oil pumping and increases the life of your car considerably.

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As a Weeks' Super Carburetor agent your earning capacity is limited only by your efforts. Hundreds of men, no different than you, who found it difficult to make a living, achieve amazing success with us. Get out of the rut and into the big money class. $5,000 to $10,000 a year can be made.

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Our workers are provided with a FREE sample so they can convince themselves of the merits of the Weeks' Super Carburetor. You owe it to yourself to find out full particulars about this big money making proposition and FREE sample without obligation. Remember, time is money—don't delay—send name today.

WEEKS' SUPER CARBURETOR CO.
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MAKE YOUR FORD Into The "LARK"

$5.00 Red-i-Kut life size patterns

Famous sure-fit *RED-I-KUT* life-size patterns and picture instructions show how you can easily convert your Ford into this **Fast, Saucy, Sport** Car as thousands have done, with easily obtained materials. No need to lay up the car. Rear seat folds, making 4-passenger car. *Send 10c coin for actual body photo and new manual of other distinctive sport body patterns from $5.00 up—"RKO" Steel "Swing-Lo" irons, Tops and Windshields. ORDER RIGHT NOW.*

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Leather Jerkins $3.95

For absolute protection against the coldest weather get one of these genuine leather jerkins.
Warmly lined with ALL WOOL khaki cloth. Leather will not crack or harden after wetting. Sizes 38-40-42. Only $3.95 postpaid. C. O. D. 10c extra. *Order today. Satisfaction or money refunded.*

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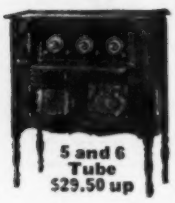
NEW ZEALAND REDS—Chinchillas—Flemish Giants

MAKE BIG MONEY—We supply stock and pay you following prices for all you raise: Belgian Hares $2 each—New Zealands $3 each—Chinchillas $4 each—Flemish Giants $5 each. 32-page illustrated book, catalog and contract, also copy of **Fur Farming** magazine, tells how to raise skunk, mink, fox, etc., for big profits, all for 10c. Address

OUTDOOR ENTERPRISE CO., Box 25, Holmes Park, Mo.

Information on any book free. Write Popular Mechanics Press, Chicago, Ill.

LAUREL and SINCLAIR RADIO Sets



5 and 6 Tube $29.50 up

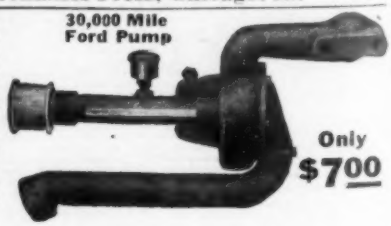
The lowest-priced high quality radio receiving sets on the market. Extraordinary selectivity, coast to coast reception. Five-tube and six-tube sets from $29.50 up. Many superior features of design and construction to bring better, stronger, clearer reception. Beautifully finished console cabinet designs if desired. Console cabinets only, $17.50 to $35. Write for free booklet and confidential discount sheet for dealers and salesmen.

Laurel Overhead Valve Systems for Fords

Laurel overhead valve, cylinder-head permits 65 m. p. h. speed for Fords, save gas, increase power. Low cost, easy terms. We specialize in racing cars and racing heads. Write for circular on money-making LAUREL specialties.

LAUREL MOTORS CORP., Dept. M2, Anderson, Ind.

30,000 Mile Ford Pump



Only $7.00

Tobacco Is Hurting You

Look at the facts square in the face, Mr. Tobacco User. You may think tobacco is not hurting you.

That is because you haven't as yet, perhaps, felt the effects of the nicotine poison in YOUR system. For **you** know that nicotine, as absorbed into the system through smoking and chewing tobacco, is a slow working poison. Slow, yes—but **sure.**

Tobacco is lowering your efficiency. It slows a man down. Makes it harder for you to concentrate your mind on your work. You haven't near the amount of "pep" and energy you would have if you stopped using it. There's many a man twice as old as you in years who's twice as young in energy, simply because he lets tobacco alone.

Some day you will realize to what an alarming extent tobacco **has** undermined your system.

When your hands begin to tremble—
and your appetite begins to fail—
and your heart seems to "skip a beat" now and then—
and slight exertion makes you short of breath—
then you have a right to suspect that
TOBACCO is getting the upper hand.

Any well-informed doctor will tell you that these are only a few of many symptoms of tobacco poisoning.

And **YOU** know that the use of tobacco in **any** form is an **expensive,** utterly useless habit. You know you **ought** to quit.

Tobacco Habit Banished

Let Us Help You

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it—whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—Tobacco Redeemer will positively remove all craving for tobacco in any form in a very **few days.** Not the slightest shock to the nervous system. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

It is in no sense a substitute for tobacco. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It helps to quiet the nerves and make you feel better in every way.

Results Guaranteed A single trial will convince you. Our legal-binding, money-back guarantee goes with each full treatment. We will refund every cent you pay for the treatment if after taking it according to the easy-to-follow directions, it should fail to banish the tobacco habit completely.

SEND Coupon for Free Proof Let us send you our **free** booklet on the deadly effects of tobacco, together with testimonial letters from men all over the country telling how they have been absolutely freed from the tobacco habit by this simple home treatment. You could not ask for stronger proof that **Tobacco Redeemer** will free you from the habit than the evidence we will gladly send on request. Just mail the coupon—or a postal will do.

NEWELL PHARMACAL CO.
Dept. 300 Clayton Station **St. Louis, Mo.**

Free Book Coupon

NEWELL PHARMACAL CO.

Dept. 300 Clayton Station St. Louis, Mo

Please send, without obligating me in any way, your free booklet regarding the tobacco habit and proof that **Tobacco Redeemer** will positively free me from the tobacco habit or my money will be refunded.

Name .....

Street and No. .....

Town..... State.....

Lowest initial cost!
Lowest upkeep!
No garage bills!
No traffic delays!

Real Fun
Always on Time
—and you save money with these two pals

INDIAN PRINCE — *THE SOLO SINGLE*
INDIAN SCOUT — *THE SOLO TWIN*

WHY be a slave to stuffy, crowded trains and trolleys? Hop on one of these famous Indian Pals and know the comfort and convenience of zippy healthful outdoor motoring—at less than carfare cost—a cent a mile or less.

Motoring with a "kick"

Easy handling—perfect balance—restful comfort—snappy getaway—lightning-like pick-up—and all the speed and power you want, at your finger tips. That's motoring at its best. That's what you get in the Indian Prince and the Indian Scout.

INDIAN PRINCE
The Solo Single
You can learn to ride it in 5 minutes. Light yet sturdy. 90 miles per gallon gas. Less than 1c per mile operating cost.
Price with complete electrical equipment $225 F. O. B. Springfield, Mass.

INDIAN SCOUT
The Solo Twin
Twin-cylinder smoothness, acceleration and power. Maximum comfort and safety. 65 miles per gallon gas. 1c per mile operating cost.
Price with complete electrical equipment $285 F. O. B. Springfield, Mass.

Easy to own

Let your nearest Indian Dealer demonstrate the Indian Prince and the Indian Scout and tell you about his pay-as-you-ride plan. Mail coupon below for free illustrated catalogue describing these two famous Indian Pals.

DEALERS: A few good territories open. Our proposition is a winner for ambitious men. Write now.

Indian Motocycle Co.

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MORE THAN a score of new circuits—all the latest and best. Complete parts at prices that mean big savings for you. And all the latest parts and accessories as advertised in current radio magazines. The largest, most complete and up-to-date radio stock in the world. Yours to choose from in this new catalog. Write for your copy.

$100 to $125 PROFITS WEEKLY

New line of quality toilet goods sells like wildfire. No experience required. All you do is take orders from this beautiful sample case. Finest perfumes, soaps, facial creams, bath salts, face powders—wonderful products at prices that appeal to all women. Just send name and address for FREE CATALOG.

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A Splendid Shoe At A Low Price

Long Counter Arch supporting the foot in our Brockton, Union Made, double sole-Calfskin-Munson last-shoe. Featuring Oak Tan leather sole. Leather insole. Solid leather Heel Base. Inverted Storm Welt. Goodyear Welt Process. Made in Brown or Black. Rubber Heels. Order a pair and judge us by our product. We ship, C.O.D. or send money order. Write for agents' proposition.

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All you need is a desire to work and make good. We show you how. Any average man, satisfied with $35.00 to $50.00 a week to start, can establish an income for life with us.

THE J. R. WATKINS CO., Dept. 260, Winona, Minn.

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You must have this latest guide to Radio prices and Radio quality. All of our vast resources and radio experience have been utilized to assemble for you in one gigantic institution, the best and newest things in radio. The Randolph catalog is indeed the radio market place of the world—a masterpiece of merchandising that befits our house—THE LARGEST EXCLUSIVELY RADIO MAIL ORDER HOUSE IN THE WORLD.

RADIO Bargains

OVER 2000 ITEMS

From the most beautiful, fully equipped console radio set, down to the smallest part or tool for the set builder—kits, parts and supplies of every conceivable type and style. 5, 6, 7 and 8 tube sets, with three dial, two dial, and the newest and most popular single simplified control. All sets are assembled in beautiful, genuine mahogany and walnut cabinets in a choice of latest types and designs. A complete line of **"B" batteries, eliminators,** including the famous **Raytheon Eliminators;** latest types loud speakers, cone speakers, "A" power units. Everything in radio at **money saving prices.**

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Include the following well known circuits, designed and approved by the world's foremost radio engineers: **Madison Moore Super; Victoreen Super; Silver Marshal Six; Sargent's Infradyne; Remler Super; Short Wave Kits; 9-in-Line Super; New Acme Reflex; Cockaday; Neutrodyne; Browning-Drake;** all classes of **radio frequency, Popular Mechanics and and other Superhets.**

Save 1/3 to 1/2

We Save You Money because we handle radio exclusively and sell a tremendous volume of everything in Radio. Volume purchases regulate prices.

We command rock bottom prices from manufacturers, and in many cases we contract for entire factory output of exclusive products. You will benefit by our great volume of purchases and sales, by securing anything you may want in radio at a substantial saving.

Beautiful hand rubbed, two-toned mahogany finished cabinet, size 18 x 19 x 36. Built-in loud speaker.

Columbia Grand
6-Tube Console Set

Here's a sensational bargain in a console radio with built-in loud speaker and adjustable unit. Spacious compartment for all batteries, etc. Very latest type 6 tube tuned radio frequency receiver. Low loss modified straight line frequency condensers. Has three stages of low ratio audio amplification. Designed to accommodate new power tube. Equipped with X-type sockets. Beautiful gold etched panel with handsomely engraved designs. Price of set with accessories..... **$42.65**

This set with all accessories, which include 2 45-volt "B" batteries, 100 Amp. Hr. storage "A" battery, 6 201A tubes, aerial and ground equipment—everything complete, nothing else to buy..... **$65.95**

These sets are typical examples of the bargains in our catalog. You may order direct from this page, sending P. O. money order or draft for full amount. We ship freight or express, charges collect.
We guarantee to back up every article with our own, as well as manufacturer's, assurance of good quality at the right price.

We have Popular Mechanics 1927 Super as shown in Popular Mechanics at a Special Offer Price

Symphonic Five

Brown Spanish leatheroid finish cabinet with gold engraved walnut panel to match. Contrasted beautifully with the black fine tuning knobs. Two small knobs control volume and clarity. The volume control is of the finest smooth slow variation type. Roller bearing. Condensers are of the modified straight line frequency type, substantially constructed and of latest design. All is sub-panel mounted, using the new X-type socket. Latest developement in solenoid coils. Two stages of low ratio audio amplification with high grade transformer offers the true amplification required for both low and high tones.

$24.90 Without Accessories

The set complete with five type X201A tubes, two 45 volt "B" batteries, one 100 Amp. Hr. storage battery, complete aerial equipment, one battery cable attached, including cone speaker of the same type as pictured.. **$54.75**

Columbia Senior Six

Beautiful table set. New localized control. One hand to tune with, three rotating drums easily controlled and easily logged. Dark finish etched panel mahogany finished hand-rubbed cabinet. Size 7x22.

6-tube set, giving tremendous volume, wonderful tone quality, latest straight line condensers, solenoid coils; sub-base mounting and new amplification. Designed to sell for over $100.00 Price, without accessories..... **$36.50**

Set complete with two 45-volt "B" batteries, 100 amp. hr. Storage "A" battery, one 4½ volt "C" battery, six type X201A tubes, complete aerial kit, attached battery cable, quality cone speaker or Victor horn type loud speaker..... **$65.45**

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Space limitations here prevent our telling you more about the Randolph Catalog. Simply fill out and mail the coupon—or you may send a postal or letter—and this truly remarkable Radio book will come to you **ABSOLUTELY FREE.**

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This Coupon Brings the Great RADIO Book FREE

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Amazing "Sure-Fire" Demonstration

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Makes Fords Run on 94% Air

Not a cheap, flimsy device, but a nationally advertised, proved attachment that actually saves Ford owners $100.00-$300.00 every year. Saves its cost in gas and oil within three weeks. Sold on 30 days' trial. Used by Nationally Known Companies who recommend and endorse it. One demonstration never fails to bring big returns.

Get Free Blancke Plan

that starts you in your own big, profitable business without capital or previous experience. Start to make big money—beginning *now!* Write today without fail.

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Cadillac and Delco Light now use as Standard Equipment Thermostatic Carbureter Control under Blancke License.

6 VOLT — 150 VOLT

"A"——AND——"B"

ELIMINATOR

Guaranteed to work any set up to eight tubes or any set in this magazine. **$37.50**

All "A" and "B" eliminators have automatic relay control and work from set switch. No set changing is necessary. Like our "B" eliminator, they operate from 110-135 Volt A. C., any cycle.

UNION "B"

100 Volt "B" eliminator, 20 milliamps	$ 7.75
100 Volt "B" eliminator, 60 milliamps	10.98
135 Volt "B" eliminator, 60 milliamps	16.98
150 Volt "B" eliminator, 60 milliamps	17.98
40 Volt "A" 199 eliminator, 65 milliamps	11.00
6 Volt "A" 201A	17.50
Automatic Relay for "A" & "B"	4.50

Every unit comes to you complete with a two-year written guarantee. No extras to buy. Guaranteed to be equal or superior to any eliminator regardless of price. **Use it for ten days** to convince yourself, and if not satisfied return it in good condition and your **money will be refunded.** "B" eliminators will be shipped on receipt of one dollar deposit.

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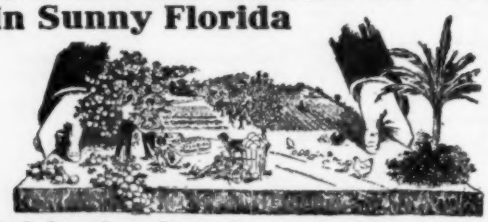
SURETY MANUFACTURING CO.
26 W. Washington St., Dept. 12, CHICAGO

A Home and Income for You in Sunny Florida



Be Independent—Own a Grapefruit and Orange Grove—A Truck or Poultry Farm. Increase Your Income

THE RIGHT LAND IN THE RIGHT LOCATION AT **THE RIGHT PRICE** WE HAVE IT—Any Size Farm

These splendid lands are suburban to Tampa, the metropolis of South Florida. Here you find the most healthful, the most delightful climate in North America. For fifteen years we have been right here helping develop Hillsboro—the banner agricultural County of Florida, and we are still here to serve you and to help you obtain the farm you want, on very easy payments extending over 2 or 3 years' time to suit.

$300.00 to $500.00 Per Acre Profit

This is not an unusual return for truck farmers in the Famous Tampa district. All kinds of vegetables can be grown. Big prices are paid for early potatoes. Winter cabbage, Bermuda onions, tomatoes, celery and dozens of other vegetables during the Winter and early Spring, when the north is covered with ice and snow. Strawberries, Melons and other small fruits, also yield large profits.

Write for Facts About Sunny Florida. IT COSTS YOU NOTHING TO LET US PROVE TO YOU that we have the land you want—in the location you want—at a price you can afford to pay and on the easiest terms you can imagine. Let us show you. Fill out and mail us the coupon today and receive our large descriptive book FREE!

NORTH TAMPA LAND CO.
404 Zack Street Tampa, Florida

Coupon for FREE Book on Florida

NORTH TAMPA LAND CO.
404 Zack St., Tampa, Fla.
Please send me your large illustrated Book, "The Call of the Southland," on choice Citrus Fruit and Truck Farms suburban to Tampa, Florida.

Name.....
St. No.....
City.....
State.....

Please mention Popular Mechanics

"Been on a vacation Bill?"

"No, Jim—I've stopped smoking. Gained six pounds in a week. You know how I used to smoke—a package of cigarettes and a cigar or two a day—it sure had some hold on me. But I'm cured—took a scientific home tobacco treatment—fixed me up in two weeks.

"Wasn't hard on me at all—noticed improvement the first day—I feel like a new man. It didn't interfere with my work—didn't leave any druggish after-effects—the money I saved in the last two weeks has paid for the treatment alone.

"Why don't you take it? It has cured men like you and me for over forty years—it is a doctor's individual prescription that sure fixes you up. Just send the coupon for full information NOW. No obligation. All correspondence is strictly confidential."

The Keeley Institute, Dwight, Ill.

Please send me, without any obligation on my part, your free booklet which will tell me how to rid myself of the tobacco habit.

Name.....
Town.....
Street..... State..... PM-12

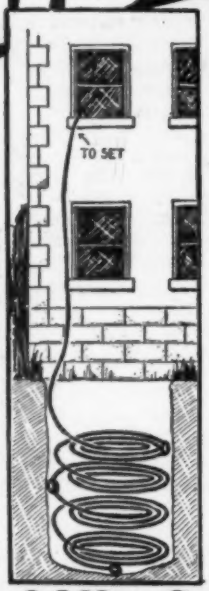
PATENTED

SUBANTENNA!

The Amazing, New UNDERGROUND ANTENNA SYSTEM

Eliminates ALL Interference

Increases Distance—Kills Static



Science Now Offers a Positive Means to Enjoyable Long Distance Reception

How often, when perhaps for days you have anticipated listening to a certain program from some distant station your set has failed you—all because of the condition of the air. And too, how often "man-made" static, such as leaky power lines, a nearby electric motor or some other nuisance has spoiled your radio evening.

Indeed, there has been a dire need for some means of overcoming these obstacles. And now it has actually been accomplished, and not by muffing of killing the sensitivity of the set as some devices do, but by filtering out the unwanted impulses. SUBANTENNA is the answer, for it not only cleans up the reception before it reaches the set, but it actually gives greater distance, bigger volume to weak signals and finer selectivity. Send the coupon at once for full particulars and special Trial Offer.

Almost unbelievable, yet entirely true; SUBANTENNA positively makes *every* night a good radio night. For, no matter what the season, the condition, or the weather, you get clean, clear reception, free of the harsh, annoying crackles and crashes that make distant reception a miserable impossibility with a regular antenna.

Get Distant Music Clear as Local

No longer need static, air noises, arc lamps, leaky power lines, street car trolleys and other disturbances spoil your radio enjoyment. For now, you can bring in station after station with the clearness of a crisp, cold winter night. SUBANTENNA—the new underground pick-up system—gets nothing but the pure radio waves.

Use Filtered Ground Waves. Not Noisy Air Waves

Being buried in the ground and *shielded*, SUBANTENNA is sensitive only to the continuous broadcast wave. The intermittent impulses such as static, power line crashes, etc., are filtered out and grounded before they reach SUBANTENNA. Hence, you not only get clear reception from this new wonder system, but you get greater distance, because the radio signal is not held back by the interfering noise level.

Not Just a Wire. Nothing Else Like It

SUBANTENNA is not just a wire. It is a patented device consisting of a specially treated wire, uniquely insulated and sheathed in a lead jacket, and containing three specially constructed pick-up or building-up coils. Nothing else will do what SUBANTENNA does. And it's the only device of its kind in the world.

Make This Test

Select a night that is unusually bad for distant reception. First connect your set to your regular aerial. Then connect it to SUBANTENNA. If you do not get the results we promise, we agree to promptly refund your money.

Send Coupon for TRIAL OFFER

Right now—decide to tear down your aerial; that unsightly, inefficient combination of sticks and wire that is obsolete. Just send the coupon and we'll mail you full particulars of SUBANTENNA—the first and only really practical system of radio reception. Mail the coupon NOW—for special TRIAL offer. Clip at once!

CLIP AND MAIL NOW

CLOVERLEAF MANUFACTURING CO.,
2715 South Canal Street, Chicago

At once—send me full particulars of SUBANTENNA, also tell me about your special introductory TRIAL OFFER. This does not obligate me in any way.

Name.....

Address.....

Cloverleaf Mfg. Co. 2715 South Canal St., CHICAGO

GOOD instruments make good players. Own the finest. King band instruments bring you the applied results of 30 years' acoustical research and practical experience. They meet every professional standard. Your complete satisfaction flatly guaranteed. Learn more about these unusually fine instruments. Complete information, together with a ten day free trial offer, sent on request. Other instruments taken in trade.

KING Band Instruments

The H. N. WHITE Co., 5211-82 Superior Ave., Cleveland, Ohio
I am interested in _____ Instrument
Name _____
Address _____
City _____ State _____

$2.75
2 pairs for $5.00

Add 50c West of Rockies

Children Love This Amazing Toy

Children's natural activity makes them wildly enthusiastic over Kangaroo Springshoes. It's like dancing on air. New thrills and fun added to all the old games. Simple, easy and SAFE. The real health-toy recommended by doctors. A smooth surface not necessary—will go where roller skates cannot. Strong and durable—nothing to get out of order. A Christmas gift prized above all others.

ASK YOUR DEALER—or mail coupon

LITTLEFIELD MFG. CO.
703 N. Halsted St., Chicago

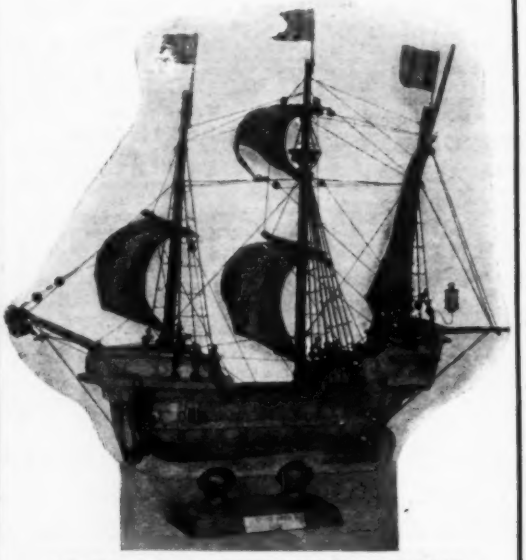
Enclosed is $.....for.....prs. Kangru-Springshus with the understanding that money will be refunded if not satisfactory.

Name.....Age.....

Address.....Weight.....

City.....State.....

You Can Build This $100.00 Ship Model for $4.98



COLUMBUS FLAG SHIP "SANTA MARIA"
Size: HEIGHT 25 in. WIDTH 11 in. LENGTH 27 in.

Let the World's Largest Builders of Ship Models Help Build Your Model

After receiving hundreds of letters from Home Mechanics asking our advice as to how to build ship models we have decided to try out a plan wherein every one may own a beautiful $100.00 Ship Model at a cost of $4.98. We will furnish you with the completed parts, cut and fitted and ready to be put together. The only tool necessary is a small hammer. The parts include hull, decks, railings, steeps, keel, side balconies, decorated stern, rudder, stand, brass name plates, cannons, port rings, anchors, shields, rubbing strips, masts, yard arms, sails, crow's nests, flags, lamp and holder; complete set of rigging, including pulleys, string, staples, brads and glue. Full directions with every boat and parts are cut to fit. Anyone can put model together in less than three hours. You may order Santa Maria parts as pictured, or Mayflower parts at this price. **Make one for a Xmas gift.**

If you are a dealer write for our prices on completed models, and parts.

MINIATURE SHIP MODELS
3216 BARING STREET PHILADELPHIA, PA.

Miniature Ship Models,
3216 Baring Street,
Philadelphia, Pa.

Please send me the completed parts of your Ship Model .....cut and fitted,
Name of Model here
ready to be put together. I will pay Postman $4.98; plus Postage (a few cents).

Name.....

St. or R. F. D.....

City.....

State.....

WET CELLARS MADE DRY *from the Inside!*

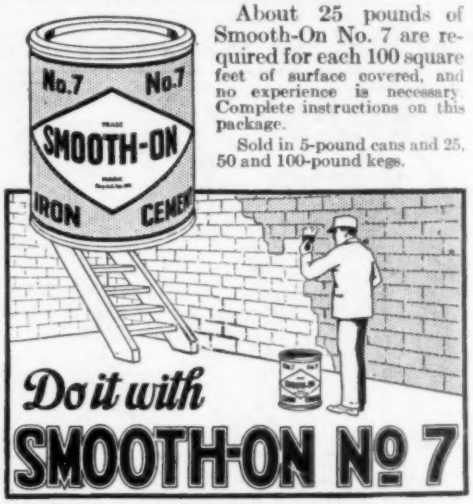
DAMP musty cellars are unsanitary, a danger to health and a poor place to store valuable material.

Where water or moisture seep in through cracks or porous spots in the floor or walls, you can make and keep your cellar dry and sweet—a fit place to work, free from odor, mold and rust—by filling the cracks and coating the moist surface with Smooth-On No. 7.

Write for FREE BOOK

This is the one practical waterproofing that you can apply yourself, easily, from the inside, to wet or dry surface and with every assurance of thorough water-tightness, even in the wettest seasons.

Excellent also for patching concrete floors, waterproofing garage, stable and washroom floors, brick walls, cisterns, septic tanks, water troughs, fountains, fish ponds, swimming pools, manure pits, etc.



About 25 pounds of Smooth-On No. 7 are required for each 100 square feet of surface covered, and no experience is necessary. Complete instructions on this package.

Sold in 5-pound cans and 25, 50 and 100-pound kegs.

SMOOTH-ON MFG. CO., Dept. 37,
574 Communipaw Ave., Jersey City, N. J.
Please send the free Smooth-On Repair Book.

Name .....

Address.....

.....

Return this coupon for FREE copy of Booklet

If You Give a Movie Camera Be Sure it Uses *Standard* Film

Christmas looms! What finer, what more practical, what more joyous gift than a motion picture camera.

When you buy this Christmas gift supreme, be sure that the camera you purchase will give you real professional pictures like those shown in the theatres. You want pictures that can be preserved—pictures of cherished scenes—the baby's first toddling steps and rapid growth—family activities—travel, sports. To do this you need a standard size film camera. (35 mm.). The famous DE VRY is the only 35 mm. standard, automatic movie camera on the market under $300.

Here is a camera, automatic and so simple that a child can operate it. Made of finest materials. It will last a life time. But the price is only $150. It can be bought on easy terms from any De Vry dealer.

DeVry
Standard-Automatic
MOVIE CAMERA

FREE BOOK You are invited to send for our new book "New Facts About Amateur Motion Picture Photography." There is no obligation.

THE DE VRY CORPORATION
Dept. 12K 1111 Center Street CHICAGO, ILLINOIS

PAWOODS CIRCLE CUTTER
(Patented)

Junior cuts holes ⅝ to 2-½ inches No. 2 cuts holes 1 to 4 inches

A time saver for hand-drill or machine use. For radio, automobile mechanics, carpenters, plumbers, electricians, engineers and anyone desiring to cut holes in hard rubber, bakelite, veneers, brass, and sheet steel. Sent postpaid anywhere in U.S. Junior $1.00—No. 2 $1.50.

GENERAL HARDWARE MFG. CO., 35 Waren St., New York

SAY! LISTEN!

A New Pair of Pants Matched to Your Coat and Vest

Just doubles the life of your suit. We can match almost any suit. 70,000 patterns. Sample is sent for your O. K. before making. All made to measure. Send piece of cloth or vest for matching.

ACME PANTS MATCHERS
Dept. A-23 20 W. Jackson CHICAGO
Enclose return postage if vest is sent

$20,000—Specialty Salesman—$20,000

Want State distributors at once. No investment. Call on merchants, banks, wholesalers and manufacturers only. $20,000 a year easily possible on greatest merchandising plan ever conceived. Unit of sale, small profits tremendous. Man capable of handling executives only kind considered. Wire or write today.
Aerial Electric Co., 128-36 W. Kinzie St., Chicago

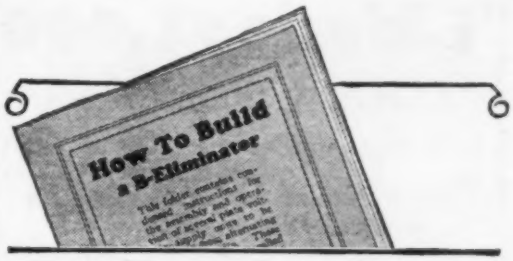
Chicago Man Discovers Gasoline Miracle!

What is this strange new miracle guaranteed to give 334 gal. of gas at only four-fifths cent a gal., instantly remove all carbon, increase power, speed, pep? Sworn proof backs our guarantee. Nothing ever like it. Not a mechanical device or gas dope. Use it only every 10,000 miles. Costs practically nothing. It is called MOTOR-MYSTERY, discovered by the eminent scientist, L. Forgrave. Startling in action. Astounding in results. Save $200 yearly. Thousands of users and testimonials.

TRY IT FREE Send no money. We trust you. Write quick for FREE TRIAL, $100 WEEK SALARY GUARANTEE to producing Agents.

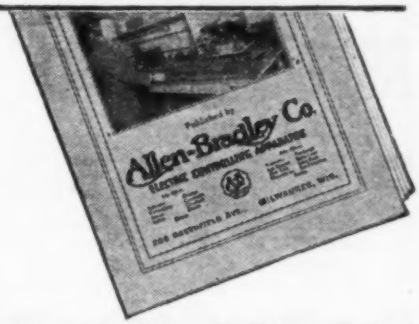
M-M LABORATORIES
6935—A28 N. Clark St. Chicago, Illinois

You All Know Him
Agents $100.00 A Week Salary Guaranteed



SEND FOR THIS RADIO FOLDER!

Contains seven hookups for B-Eliminators published in a prominent radio magazine.



When You Build a B-Eliminator

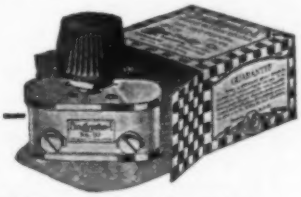
Use Bradleyohm-E for Variable Resistors and Bradleyunit-A for Fixed Resistors

ALWAYS insist that Bradleyohm-E and Bradleyunit-A are included with your B-Eliminator kit, if you want to be assured of perfect voltage control. The leading manufacturers of B-Eliminators have long since adopted these Allen-Bradley variable and fixed resistors as standard equipment for their B-Eliminators. In fact, Bradleyohm-E is used almost as universally as the Raytheon tube, itself.

Bradleyunit-A
Solid molded fixed resistor that can be soldered. Unaffected by temperature or moisture.

Bradleyohm-E
Variable resistor made in several ranges. Sold in checkered carton.

You cannot afford to risk the use of inferior substitutes for the scientifically-treated discs used in Bradleyohm-E. This remarkable variable resistor handles the strenuous requirements of B-Eliminator service without the slightest strain. Ask your dealer for Allen-Bradley Perfect Radio Devices, today.



Allen-Bradley Co.,
280 Greenfield Ave.,
Milwaukee, Wis.

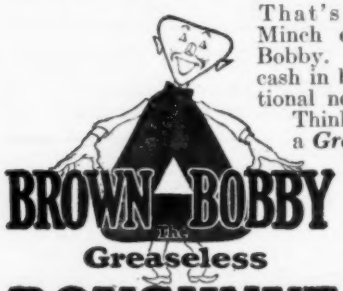
Please send me, FREE, your radio folder with seven B-Eliminator hook-ups.

Name .....

Address .....

"I Made $1,000 a Month

from the New Food Sensation *Greaseless* Doughnuts"



That's what Thomas Minch did with Brown Bobby. You, too, can cash in big on this sensational new food product. Think of it! Actually a ***Greaseless* Doughnut!**

Mrs. Nelson, Rockford, Ill., makes Brown Bobbys at home. "Sold 90 doz. last week. Will sell 3 times that many this week. Wonderfully easy."

Fair Store, Chicago, says: "It's a great money-making device." "The demand for Brown Bobby is beyond my wildest expectations," writes Jas. O'Connor, Chicago.

So it goes everywhere. Investigate!

Big Profits for YOU!

Millions of greasy doughnuts are sold daily, hard as they are to digest. What a mammoth market for Brown Bobby! Cooked without a trace of grease to a golden brown—crisped to a feathery lightness—Brown Bobby is positively the food sensation of the age. No one thought a doughnut could be made without grease. But WE did it. And **YOU** can get in on the first easy profits.

Simple, Easy and Sure

Get this! With one simple, inexpensive, electrically operated machine, you can turn out a full dozen Brown Bobbys every 3 minutes—cost, less than 1c each. No baking skill required. Just add water to our patented "Mix." No bother. No boiling grease. No odor. A child can do it. Big money for women making Brown Bobbys at home. Tremendous opportunities, in every town for a thriving business on a surprisingly small investment. Wherever there are hungry people, Brown Bobby is a sure hit. In lunch rooms, drug stores, wherever food is sold Brown Bobby offers a chance for amazing profits. Special openings for Brown Bobby Specialty Doughnut Shops in every town.

Write Quick! Be the first in your locality to get the first easy profits. Whatever your present line-up, let us present you a plan that will be feasible and full of opportunity for a steady, paying business. Just mail the coupon! Get the facts now. Profits are waiting.

FOOD DISPLAY MACHINE CORP.
28 E. Jackson Blvd., Dept.13-59, CHICAGO, ILL.

Food Display Machine Corp., Dept. 13-59
28 East Jackson Blvd., Chicago, Ill.

Gentlemen: Please send me the plan by which I can cash in on Brown Bobby, the Greaseless Doughnut. It is understood that this obligates me in no way whatever.

Name.....

Street.....

City.....State.....

Big Sale 8 DAY WATCH

Only $6.95
SEND NO MONEY
$15.00 Value

Exact Size

Runs 8 Days With 1 Winding

Here's an exceptionally sensational watch offer. This sale establishes a **new low price** for this famous eight-day watch. Think of it! Wind it and be sure of **perfect time for eight days.** It's the only watch of its kind. It's no larger than an ordinary watch—it's a wizard of a timepiece. You'll be proud to own one. Sets a new record in dependable timekeeping at a **low price.** Easily **worth $15.00.** Get yours for only **$6.95** while they last. We are almost giving them away at this price, but we want new friends and customers for our other jewelry offers.

READ THIS REMARKABLE GUARANTEE

5 DAYS' FREE TRIAL We guarantee this watch is all we claim or your **money back** after 5 days' trial and examination; also to keep perfect time and to give entire satisfaction.

NOT A NOVELTY—A REAL TIMEKEEPER

Built for **real dependable timekeeping. Has 6-jewel** lever with exposed balance wheel which shows action of movement. **Stem wind and stem set.** Solid nickel, hinge back case. **Silver finish dial.** These features make this 8-day special an attractive ornament besides being useful.

YOU CAN GET YOURS ALMOST FREE

Those who order at once will receive six merchandise coupons, having a value of one dollar each. You easily sell these to your friends and keep the six dollars collected—then your watch will only cost you 95 cents.

HOW TO ORDER — SEND NO MONEY

Don't send a cent now! Just send your name and address. We ship your 8-day watch and six one-dollar merchandise coupons by return mail. Pay postman **$6.95** plus a few cents postage. If not pleased after **5 days' trial,** return watch and get your money back. Act quickly while supply lasts. **You take no risk.**

DISCOUNT WATCH CO. 22 W. 48th St., NEW YORK

MAKE MONEY QUICKLY

raising guinea pigs, squabs, etc., at home in spare time. Highest prices paid to raisers. Market guaranteed. No experience necessary. Free illustrated booklet.

Mutual Food Products Co., 1459 Broadway, New York

Imperial Sanitary Floor

Put on like Plaster
Wears like Iron
-waterproof
fireproof
resilient
noiseless
dust-less

Base and Floor one solid piece

A composition material easily applied in plastic form over practically any kind of floor. Laid about ⅝ inch thick. Imperial floor does not crack, peel or come loose from foundation. A continuous, fine-grained, smooth, non-slipping surface. No crevices to gather grease, dirt, dust, disease germs or moisture.

Ideal Floor for Kitchen, Pantry, Bath Room, Laundry, Porch, Garage, Restaurant, Theatre, Hotel, Factory, Office Building, Railroad Station, Hospital—wherever a beautiful, substantial floor is desired. Several practical colors. Full information and sample FREE of your first and second choice of colors.

Imperial Floor Co., 79-83 Halstead St., Rochester, N. Y.

A Success for 15 Years

LYNCH METALLIZED

WARRANTED FIXED RESISTORS

THE vital importance of a silent, accurate resistor cannot be overestimated. Comprising a concentrated metallized deposit one-thousandth of an inch thick, upon a glass core and sealed forever within the tube, each Lynch Resistor is warranted absolutely noiseless, permanently accurate, dependable! Guaranteed accuracy—10%; in production they average 5%. .25; .5; 1; 2; 3; 4; 5; 6; 7; 8; 9; 10 Meg., 50c. .025; .09; .1 Meg., 75c. Single mounting, 35c; Double, 50c. If your dealer cannot supply you, send stamps, check or money order. We ship postpaid same day order is received.

Dealers—Get on our mailing list; we keep you posted on new developments. Write us today!

ARTHUR H. LYNCH, INC. MEMBER RMA 4-26-A 250 W. 57th Street New York, N. Y.

Big Xmas Sellers

Make $1,000 between now and Xmas! Easy sales. Big list of holiday combination offers. Big season just ahead! Write today for list **18N.**

C. I. TOGSTAD CO.
25 S. Clinton St. Chicago, Ill.

200 Sheets and 100 Envelopes $1.00 Postpaid

Printed in Rich Dark Blue
Your Name and Address Included

TYPE IS CLEAR GOTHIC

Personal Christmas cards 60c per doz. Calling cards 60c per 100. Send cash, money order or stamps. Write or print plainly. Orders for Christmas delivery must be in by the 10th of December.

STANDARD PRESS, 3658 Diversey Ave., Chicago, Ill.

THE WOTEN GASOLINE ENGINE

Air-cooled—Water-cooled. One H. P. in 20 pounds. Handiest little engine ever made. Ideal wherever power is needed. Also the **Metalumen Model Airplane Engine**, one-half H. P. in 3½ pounds. The market demands them in thousands. Generous agency propositions on request. Complete line of small gasoline and steam engines, battery chargers, etc. **Catalogue Free.**

DYNAMIC MANUFACTURING CO.
First Nat'l Bank Bldg., Dept. 7, CHICAGO

Gas Blow Torch and Solder Iron Heater

Connects to any gas jet or gas connection. No air attachment necessary. Heats solder iron in less than a minute. For home use, repair shops, electricians, plumbers, laboratories, manufacturing plants, foundries, etc. A wonder for the mechanic's work bench and radio builders.

A Blast 8" long, 1" in diameter—Intense Heat.
Postpaid $1.00; Canada $1.40

Tri-une Company, Dept. 802C, 215 S. 15th Ave., Maywood, Ill.

for Foot Protection

Herman Shoe No. 19 is designed and made especially for men who spend most of each day on their feet.

A good-looking gun-metal calf shoe on the genuine Munson Last, with built-in leather arch support and storm proof rubber welt. Exactly the same shoe that we make for the New York Police Force, built to give long wear and genuine foot protection.

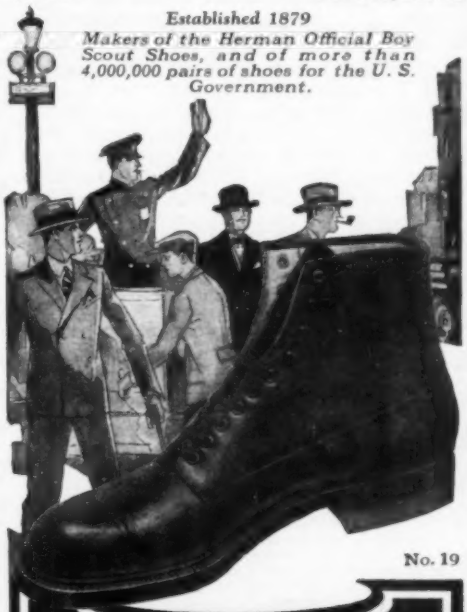
Foot specialists report to the Foot Protection Bureau that they absolutely endorse this famous shoe for absolute comfort, foot support and ease.

Let us send you the name of a nearby dealer who can show you these shoes. Send for illustrated folders.

JOSEPH M. HERMAN SHOE CO.
Dept. 34 MILLIS, MASS.

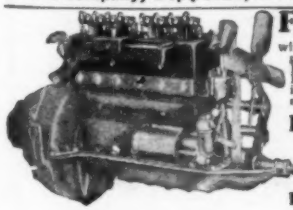
Established 1879

Makers of the Herman Official Boy Scout Shoes, and of more than 4,000,000 pairs of shoes for the U. S. Government.



No. 19

HERMAN POLICE SHOE



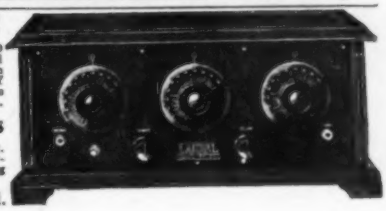
Fords Go 65 Miles an Hour!

with LAUREL Overhead Valve cylinder head. Increases FORD power 50 percent. Saves gas and oil. New model 40-S fits all FORDS including new 1927 model. Equip your car with LAUREL, the original overhead valve system. Beware of imitations. Only $35 cash, balance easy payments. We specialize in racing heads and complete race cars. Write us.

LAUREL and SINCLAIR RADIO Receivers

Lowest-priced high quality 5 and 6 tube sets on the market. Coast to coast reception. Embody latest radio engineering ideas. Write for literature. Big moneymaking proposition for dealers and agents.

LAUREL MOTORS CORP., Dept. M, Anderson, Ind.



Made in both power drive and hand drive models.

$15 to $20 a Day Profit IN YOUR OWN BUSINESS

HERE'S a business that's not overcrowded with competition, a cash business—no credit losses—a business for whose service there is a big, steady, year 'round demand everywhere, a business that requires very little capital to start—a clean, dignified business.

Think of the many people in your community who have saws that need to be filed frequently—carpenters, contractors, butchers, factories, farmers and many homes. You can now file saws *automatically* with machine-precision—with the

FOLEY AUTO MATIC SAW FILER

With it one man can do four to six times as much work as the most expert hand filer, and so accurately that saws will cut better than new. It files hand saws, band saws, back saws and circular saws. It is very easy to operate.

You get 50c or more for filing each saw, and $1.25 to $1.50 for retoothing saws. You can file 6 to 8 saws in one hour with one machine. The Foley quickly pays for itself and goes on earning profits year after year.

30-Day Money-Back Guarantee

Use the Foley for 30 days in your own shop. If after this fair trial you are not satisfied, your money will be refunded. Send the coupon now for full information.

Foley Saw Tool Company,
210 Foley Bldg.,
914 East Lake St.,
Minneapolis, Minn.

Send me full information on Foley saw filing equipment.

Name.....

Address.....

City.....State.....

Big 3 ft. Telescope

Has unusually powerful lenses —**magnifying over 8 times.** Makes people and objects miles away seem close Brings new pleasures to home, farm, camp, travel, sport See moon and stars as never before. New Ferry "Wonder" telescope has 5 sections—opens out over 3 ft. long, measures 12 inches closed. Big, strong and powerful yet light, compact, easy to carry. Body and draws fully brass bound with knurled edges. Body covered with black leatherette, draws made of special, smooth finish fibre, easy to slide in and out Brass safety caps at each end to keep out dust. Powerful lenses are special clear achromatic European optical glass.

3 ft. long open — 12in. long closed — FIVE SECTIONS — 8-power Lenses

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YES ABSOLUTELY FREE! Handsome leatherette covered Carrying Case light, strong, complete with strap. Case is 12 in. long, 2 1-2 in. in diameter. Protects from dust and damage Handy for farmers, auto tours, hikes and hikers.

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"I am delighted with the 'Wonder' telescope. Today I have been watching submarines 3 miles off the coast." —Philip Brusn "I can see across the Mississippi 3 miles and see people fishing."—M L. Thorn. "I am nearly 80 years old and if I could not get another would not take $10 00 for it."—A. R. Walker 'I can tell time on the church clock 5 miles away "—Edward Foster. "Could tell color of aeroplane 4 miles away."—Mrs. L. M Yarbrough. "I saw a Light House 18 miles away." — Clyde Scribner." "Can see men working 7 miles away."—S. M. Gearhart.. "I could see windmill more than 4 miles away "—Raymond Cosanova.

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Sign and mail coupon below and Ferry Wonder 3 ft. Telescope with free Carrying Case will come by return mail. Pay postman special bargain price of $1.85 plus few cents postage Satisfaction guaranteed or your money back Send coupon today!

FERRY & CO., Chicago, Ill.

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AMERICA'S new way to fight fire will pay you at least $12 a day. All you need to earn $360 a month to $6000 a year is the ability to follow our instructions.

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Payne took our plan and averaged $20.77 a day, his first 217 days—$4,500! De Pries, who never made more than $85 a month before, has made $7,000 in one year.

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Fire takes a toll of 1,700 lives every year, and $550,000,000 in property. No building is safe from this constant menace. Only a few have insurance. No one wants to see the savings of a lifetime wiped out. No business can afford the loss of time, trade and reputation which fire causes. Fire protection is a vital need.

No wonder Fyr-Fyter representatives sell over $2,000,000 worth of Fyr-Fyters yearly! No wonder they are one of the highest paid selling organizations in the country! No wonder T. S. Gill writes: "I am firmly convinced that any man joining the Fyr-Fyter force and working eight hours a day will soon show earnings of $5,000 a year!"

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Fyr-Fyter is the most perfect fire prevention device ever invented. It shoots hundreds of quarts of vapor from one quart of liquid. This wonderful new chemical is absolutely harmless to rugs, clothes, furniture and human beings, but it snuffs out fire like a blanket. It amazes everyone who sees it. Fyr-Fyters are approved by the Underwriters' Laboratories. There is a size for every need.

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Every fire alarm speeds up your sales. Every new building means easy, extra profits. Farms are one of the richest fields. Homes alone, can pay you $4,000 a year. Autos, trucks, and garages are another source of income. Factories, institutions often buy in large quantities.

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Capacity 0" to ¾" drills. Wide speed range, versatility, handiness, plus a maximum of drilling efficiency make the Baby Grand supreme in its class. Comes complete with chuck as shown.

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.6 ampere charging rate. Absolutely noiseless—no bulbs—makes a power unit of your battery.

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Charges at 2½-3 ampere. Absolutely noiseless—no bulbs—can be used while set is operated.

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Silite, the marvelous new metallic glass rectifying element, provides perfect rectification of light socket current into "A" battery power. Leave the Silite Trickle Charger permanently connected to your storage battery and on charge—then forget battery charging forever. Silite Trickle makes a power unit of your battery—insures constant, never-failing "A" current that operates your set at highest efficiency. For very large sets, where a higher charging rate is necessary, Silite Homcharger is recommended. Either model may be used while the set is operated.

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Kodel A and B Transifiers actually supply all A, B, and C current direct from the light socket—no batteries of any kind are needed. Just plug the Transifiers into the wall socket and turn on your receiver—smooth, uniform A, B, and C power operates your set as it has never operated before. Watch the new life, new pep it gives your set—the longer range, the much greater volume. Transifiers give quiet, noiseless reception that was never before possible, even with fresh, new batteries.

Vastly different from and superior to the ordinary power units, Transifiers consume electric current only while you operate the set—maintenance cost is much less—it costs less than one-half cent for every hour the set is operated, for all A, B, and C power.

Ask any radio dealer to show you the Silite Chargers and Kodel Transfiers.

MODEL 10 "A" TRANSIFIER—Supplies 2, 4, 6-volt "A" current direct from the light socket. For sets using up to 10 tubes **$42.50**

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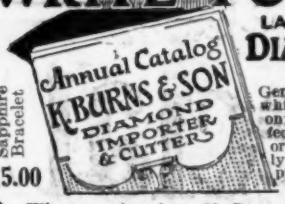

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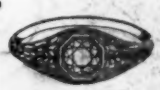

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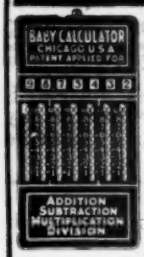

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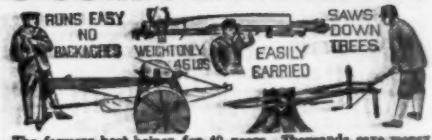

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Thousands have been waiting for just such a radio—a real long distance, powerful instrument—but at a price they can afford.

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You don't even have to give up your present position. The only time radio can be sold is in the evening—by demonstration. So here is a chance to add to your present income. During the past five years we have trained 4364 men in this very profitable business.

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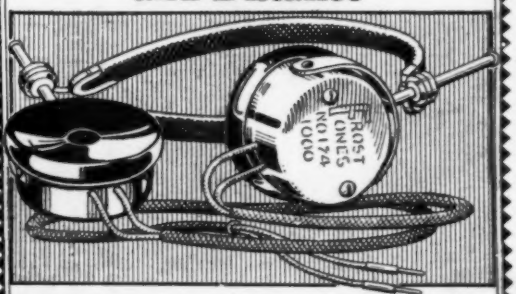

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Type 880

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Never will you be charged for any repairs, regardless if the Newark Pen is broken through accident or misuse. Never another cent of cost.

Will Last a Lifetime

The nib is made of 14-kt. gold, tipped with the best grade of hard iridium which can't wear out. Nothing can affect the super-smooth writing point. Glides over the roughest paper—yet can make 4 carbon copies. Truly a manifold pen!

Has a hand-turned barrel, cardinal red or flashing black, artistically chased. Heavy 14-kt. gold filled mountings. A pure gum sack of large ink capacity. Never-clogging; never-leaking. In every sense the equal of any $8.50 pen at a price which is **less than a storekeeper's profit on such a pen.** Made by experts with 25 years experience and sold ONLY by mail—from Maker to You.

PEN ACTUAL SIZE

FREE Premium—Get Pen for Nothing

Send no money. Just mail the coupon below. You will receive a Newark Pen and 5 premium cards, each worth 50c on the purchase of another pen. You can give them away if you wish. But you can easily dispose of these cards at 50c each. YOUR PEN WILL THEN COST YOU NOTHING.

Your choice of men's or women's models. They make ideal and useful gifts that compliment both the giver and the recipient. Show it to friends—write with it for 5 days—you'll be surprised and delighted, or we'll refund your money.

SEND NO MONEY *Mail This Coupon* *5 Days Free Trial*

NEWARK PEN CO., 276 N. J. R. R. Ave., NEWARK, N. J.

Please send me via Parcel Post collect, a Newark Pen and five premium cards which I may dispose of at 50c each. I will pay the postman $2.50 plus postage, and if I am not satisfied after five days use, you guarantee to refund my money.

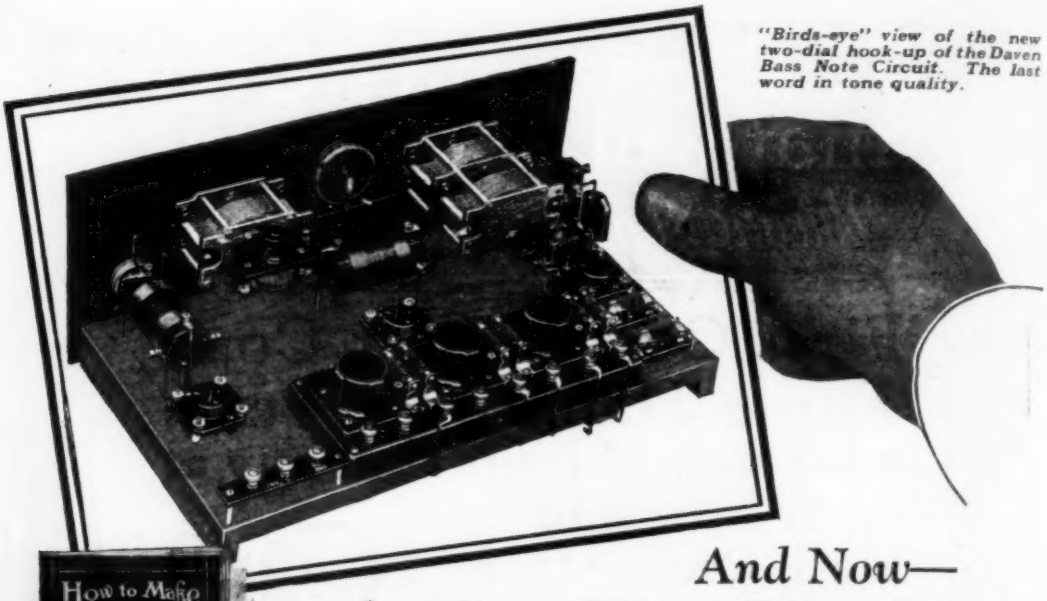
X indicates my choice:

Men's.... Women's.... Red.... Black.... Medium Nib.... Fine Nib.... Coarse Nib....

Name.....

Address.....

Town..... State..... P. M. 12



"Birds-eye" view of the new two-dial hook-up of the Daven Bass Note Circuit. The last word in tone quality.

25c at Daven dealers, 30c by mail

And Now— the Bass Note Circuit in a 2-dial hook-up

CLEARER than ever—even more selective—and always that crystal purity of tone—from highest soprano down to deepest, richest bass. The same astonishing Daven Bass Note Circuit—with new refinements added.

For instance, **two tuning dials only**—instead of the usually accepted three. A Radio Frequency choke coil that prevents the radio waves from entering the audio amplifier. A special compensating condenser that increases selectivity, especially in long-distance tuning. And a brand new layout, requiring less base space and a smaller, neater panel.

READ "HOW TO BUILD THE BASS NOTE CIRCUIT"

A brand new booklet that tells you in the simplest, clearest way how to make yourself a Daven Bass Note Receiver. And a wiring diagram of an altogether new type—a boy can follow it clearly—shows you quickly how to assemble the parts. 25c at any Daven Dealer's—or 30c by mail. And it's worth ten times as much in the new kind of radio reception it will help you obtain. Get your copy NOW—while the edition is plentiful—later on, you might have to wait for another printing.

DAVEN GLASTOR

the new Transparent Resistor. Enduring, noiseless, changeless. Complete range of resistances.

DAVEN HI-DUTY GLASTOR

Specially designed for B-Eliminators. Will carry highest currents known to radio.

DAVEN
BASS NOTE CIRCUIT
for COMPLETE *Radio Reception*

NEW 8th EDITION DAVEN MANUAL

This valuable Book explains Daven Amplification in full detail, and shows how to apply it to your set. 25c at dealers', 30c by mail.

Complete Daven Catalog Free on Request.

"The Sine of Merit"

DAVEN RADIO CORPORATION

TRADE MARK *"Resistor Specialists"* REGISTERED

162 SUMMIT ST. NEWARK, N. J.

CORONA *for* CHRISTMAS

No other portable typewriter has all these modern features

Standard four-row keyboard — the same as all office typewriters — no shifting for figures.

Visible writing — you can see what you are writing without raising your head an inch.

Full width carriage — takes a No. 10 envelope — just like any office typewriter.

Self-spacing carriage return — right out where you want it for quick action.

Adjustable paper guide — you can insert each sheet in exactly the same place, so that the margins always remain uniform.

Platen knobs—on both ends of carriage.

Automatic ribbon reverse—and twelve-yard, two color ribbon.

Variable line-spacer—no other portable has one.

Stencilling device — Corona is noted for its clean stencil cutting.

Shift key—on both sides of keyboard.

Type-bar action — exactly the same principle as that employed on all the best office machines.

Double carriage release — you can release with either hand.

Both back spacer and margin release — on the keyboard.

Models and Prices

The price of this standard keyboard Corona is $60 with case. Other models at $50 and $55. Special keyboards available for all foreign languages and technical writing. Dealers will accept used typewriters as part payment.

THE BOY who grows up without a Corona is missing something out of life. Give your boy a Corona this Christmas — see how quickly he learns to express himself clearly, concisely, on paper.

Coronatyping helps him to think; it quickens his imagination; it stimulates his interest in writing; and especially, if he is away at school, it inspires more letters back home. Try it and see!

And make sure that you get Corona. The latest model is like the standard office typewriters in everything but price and weight. It is the most popular "personal" typewriter in the world. It has over 700,000 owners, more than all other makes of portables combined.

Look for "Corona" in your phone book; you'll find there a dealer who will gladly bring this latest model Corona right to your home or office for examination. Phone him—or, if you prefer, just mail the coupon below.

L C Smith & Corona Typewriters Inc

Sales offices in principal cities of the world. Established 1903

Also manufacturers of the L C Smith Typewriter, the ball-bearing office machine

L C Smith & Corona Typewriters Inc
732 E. Washington Street, Syracuse, N. Y.

☐ Send me latest information about Corona.

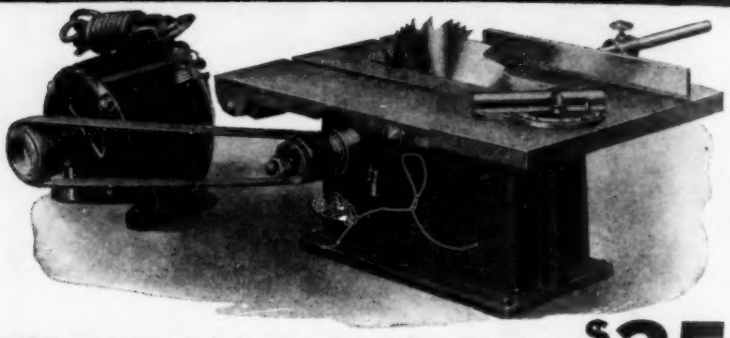
☐ What allowance would you make on my.....typewriter

Model.....Serial No.....

Name.....

Address.....

DEVITT 8" COMBINATION SAW
13 TOOLS IN ONE



Saw table raised, showing Emery wheel, saw guard and drill attachment.

Planer attachment on saw table.

Showing Sanding disc attached.

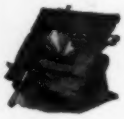


Table tilted for beveling.

Dado head attached for grooving.

YOU save a great deal of money, time and space by buying a Devitt 8" Combination Saw. Why buy special tools for beveling, grooving, buffing, etc.? The Devitt Combination Saw will rip, cross cut, bevel, miter, groove, mortise, tenon, drill, rabbet, grind, buff and polish. The attachments are easily and quickly adjusted. The saw and motor when set up ready for work occupy very little room. The ¼ H. P. 60 cycle 110 volt A. C. motor can be run from a light socket and provide power for other purposes when the saw is not in use. A cut up to 2¼" can be made with the 8" Combination Saw without planing. The ideal machine for shop, factory or home, complete with attachments: 12"x16" table, 8" Combination Saw, iron pulley for saw table, 12" ripping fence, adjustable cut off miter gauge, motor-specifications as above, 1¼" endless leather belt, wood pulley, 8 ft. cord and plug, 6" buffing wheel, ⅜" 3 jaw drill chuck, 5" emery wheel, 8" sander, saw guard, and 2" dado insert. $35.00 F. O. B. Phila. Height 16", shipping weight, 100 lbs.

$35
F. O. B. Phila.

(Planer attachment to fit on table top will smooth pieces up to 2" wide, $12.00 extra F. O. B. Phila.)

Write for our beautifully illustrated 4 page circular.

PAUL J. DEVITT 1102 South 2nd Street PHILADELPHIA, PA.

FORDS
no freezing no boiling!

Great Gas Saving

No need for winter fronts, summer pumps, or gas savers. The wonderful ***Airlock does all three.*** An absolutely genuine article which prevents freezing or boiling in any climate running or standing. It fuelizes and decarbonizes besides. Installed like a motometer. Makes an amazing demonstration. Sells like machine guns fire. Agents with Fords make $50 daily. Free trial always. Address

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Box 588 Burnett, California

Send me Agents free trial offer of your sensational Airlock.

Name.....
(Print plainly)

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MOTORCYCLES

Price $10 and up purchased through our Co-Operative Plan for as low as $1.00 down and $1.00 per week

Indians Harley-Davidsons Ace Henderson and Cleveland

Motorcycles shipped to all parts of the world

WALKER-INDIAN CO., 188 Mass. Ave., BOSTON

An Xmas Hit!

Webley Air Pistol

The Ideal Gift for Beginner and Expert Marksmen

FEEL THE HEFT OF IT! Looks, feels and shoots like a fine automatic.

Beginners perfect their aim quickly because a Webley makes no noise or dirt and practicing anywhere at any time is possible.

ECONOMY AND ACCURACY make the WEBLEY AIR PISTOL an excellent gift—it is the only air pistol guaranteed to group shots at 10 yards within 1 inch, POWERFUL enough to kill small game. Procurable in two calibres 1.77 and 22.

See the new WEBLEY AIR PISTOL at your dealers—or sent direct by mail including cleaning brush and supply of pellets for $15.

Write for descriptive booklet, "P. M."

Also makers of W. & C. Scott MAGNUM Shotguns and MAGNUM Rifles and Double Rifles. Full line at our New York Salesrooms.

Sole U. S. Agents

W. & C. SCOTT ARMS CO., Inc.
100 East 42nd St., New York

Just Out! 30 Days FREE TRIAL ON ANY 1927 Models

1-Dial 5-Tube $57.00 Retail Price

2-Dial 5-Tube $47.00 Retail Price

Westingale RADIO

The Last Word in Guaranteed Radio Sets and the Biggest Values Ever Offered

NOW!—you can put a NEW 1927 Model Westingale, 5-tube Radio in your own home and use it to your heart's content on 30 DAYS TRIAL. Entertain your family and friends. Listen to the music, concerts, sports, news, market reports from stations all over the country. Compare it with other sets for beautiful appearance—wonderful performance and low price—and if you are not convinced that Westingale gives you the greatest measure of Radio satisfaction and the best value for the money—YOU DON'T HAVE TO KEEP IT.

Why not have the NEWEST Radio? Why pay high prices? Why take chances when you can put either of these last minute Westingale Models in your home for 30 Days' Trial on the absolute guarantee that if you don't find it the most beautiful and the most satisfactory Radio set for the money, you have ever seen or heard—you don't have to keep it.

Agents Make Big Money

We want agents in every locality to demonstrate and take orders for these amazing, low-priced, last-minute Westingale Radio Models. The easiest kind of work. Just like play. Quick sales and big profits. No radio experience necessary,—we show you how. This is your chance to get into the RADIO business for yourself without capital. Build a money making business of your own or a profitable side line in your spare time.

$50 to $100 a Week—Easy

FULL OR SPARE TIME

No home is complete without a good radio. Millions will be sold this fall. Get a Westingale set on 30 Days' Trial,—use it as a demonstrator and get your share of these profits. Demonstrate to your neighbors and friends, and see how the beautiful appearance, simple control, powerful performance and remarkable low price of Westingale models make them sell on sight.

Big—Powerful—Dependable

5-Tube, Coast to Coast Sets

Every late feature,—every new, worth-while idea is built into these two 1927 Westingale Models—yet 15 unnecessary parts and many feet of useless wiring have been discarded to simplify—improve—perfect them and eliminate your radio troubles. All we ask is a 30-Day Trial at our risk to convince you that this ultra simplicity really puts Westingale Radios years ahead of all others in powerful reception,—wonderful loud, clear tone—dependable service and EASY control.

The Utmost in Distance, Volume and Attractive Appearance

Built in the new style, big, massive, period type cabinets, hand rubbed brown Walnut finish. The front panels enhanced with a beautiful Spanish Galleon design, embossed in dull gold, these new Westingale Models are as pleasing in appearance as they are in performance. Either the 1-Dial or 2-Dial Model will reach out and bring you music, concerts, speaking, sports or market reports from hundreds of broadcasting stations all over the country with enough volume to fill your home. Unbeatable for performance, appearance or price.

Don't buy a radio until you get our FREE Catalog which fully pictures and describes these two newest of all radio models and explains our 30-DAY TRIAL OFFER. Don't wait—a special introductory discount for those who write quick. Mail the coupon today. Get posted before you buy.

Your Own Radio FREE

We also have a plan whereby you can put a Westingale set in your home on 30 Days' Trial and make enough demonstrations in your spare time to get your own set without cost before the trial period is up.

Special Discount to Agents

To quickly introduce these two wonderful new 1927 Westingale Models we are offering, for a limited time, a big reduction, way below retail prices on the FIRST Westingale outfit placed in each community. Don't wait. Be first in your locality and mail the coupon or a post card today for our FREE Radio catalog, special discount offer and full particulars.

Westingale Electric Company

Dept. 120 1751 Belmont Ave., CHICAGO, ILLINOIS

Mail Today—Don't Delay

WESTINGALE ELECTRIC CO.
Dept. 120—1751 Belmont Ave.,
Chicago, Illinois

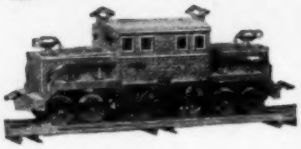
Please send me your FREE Catalog on the new 1927 Westingale Radio set. Also full particulars of your Special Discount offer on the first outfit placed in each community.

Name.....

Address.....

.....

"Don't you wish YOUR engine was the 'take-apart' kind?"



Dorfan Loco Builder Engines come in wide and narrow gauge models. This is the new Dorfan wide gauge Engine "3930."

Boys—Here's an Engine worth waiting for!

HOW many times have you wished you could take your electric engine to pieces? How many times have you *tried*—and had to send it away to be fixed—because it just wouldn't go back together again for you?

Here's an engine that *you can take apart*—often as you want to! And then put it together again—with no tool but a screw driver—and find that it runs again just the same as before! Doesn't that sound like lots more fun than just watching your train go around the track?

Go to the store where your toys usually come from and ask to see Dorfan Loco-Builder Electric trains. There are Dorfan passenger trains and freight trains of many styles. Ask to see the Dorfan Loco-Builder Electric Engine separately. Ask to see the neat outfits containing all parts with which to make a Dorfan Loco-Builder Engine. With each engine comes a sheet of simple directions which any boy can understand and follow. If you already have an electric tr. in, a Dorfan Loco-Builder Engine will make your outfit complete. Ask your dealer *today* to show you Dorfan Electric Trains. *Catalog Free—write us for it.*

Dorfan
LOCO-BUILDER
ELECTRIC TRAINS

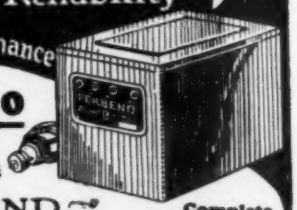
BIG PRIZE CONTEST FOR BOYS!

SHOW this ad to your dealer and ask for Free Entry Blank for the Dorfan Prize Letter Contest. 100 big prizes—radio sets, watches, cameras, canoes, bicycles—attractive prizes of all kinds, and 2000 Dorfan Licensed Engineer Diplomas. Costs nothing to enter. Every boy stands a chance to win. Closes January 15th. Get Entry Blank *today*.

THE DORFAN COMPANY
Dept. PM-12 137 Jackson St., Newark, N. J.
DEALERS: Wire or write for Entry Blanks. No boy can enter contest without one.

PROVED!

40,000 Radio Users Demonstrate Reliability and Wonderful Performance



$12.50

40,000 in Use

FERBEND "B" ELIMINATOR

Complete

Replaces "B" Batteries. Operates direct from socket on 110-120 volt A. C. lighting circuit. Delivers up to 100 volts.

Second successful year. Constant flow of unsolicited testimonials prove its splendid performance. Amazingly low in price—high in value. Equal or superior to any "B" Eliminator, regardless of price.

Ask Your Dealer—or Send Direct

Shipment made direct on receipt of price, or C. O. D. if preferred. Use for 10 days to convince yourself—if unsatisfactory write us within that time and purchase price will be refunded.

SEND ORDER TODAY.

The FERBEND "B" Eliminator is approved and passed by the rigid laboratory tests of Radio News, Popular Radio and Radio Broadcast.

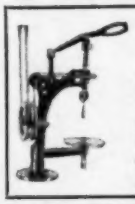
FERBEND ELECTRIC CO.
415 W. Superior Street
Chicago, Ill.

Users Are Enthusiastic

Fort Riley, Kans. Am getting wonderful results with my Eliminator and good reports from those I have sold.—Floyd M. Farwell, Wire Chief, Sig. Det.

Amsterdam, N.Y. The Eliminator is great. Have advised all my friends to get it for I know none could work any better or give more satisfaction.—Reg. Firth.

Montreal, Quebec, Can. I have sold all six of your Eliminators and every one is pleased with it. It is one of the best on the market regardless of price.—Alfred A. Michand.



RADIO DRILL

This drill was designed particularly for the amateur experimenter and manufacturer of radio equipment and is adaptable for any work within the range of its capacity.

It is equipped with a swinging adjustable table, ball thrust spindle, chuck capacity 0 in. to ¼ in., and has belt-shifter on tight and loose driving pulleys.

Manufactured by
H. & D. MACHINERY CO.
P. O. Box 2 Whitman, Massachusetts.

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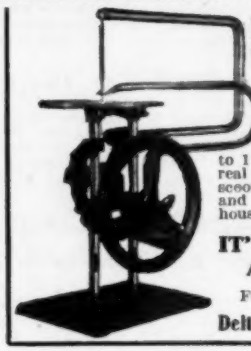
Sell Archer Made-to-Order Shoes

Sell Archer Made-to-Order Shoes. 86% of all women should wear them. Big commissions paid daily. Your repeat orders make extra profits. No capital or experience necessary. We teach you the business. Prompt deliveries. Built-in Arch which supports the bones of the foot and strengthens muscles. Double your income. No other proposition has so many exclusive advantages. Dept. Z-3126, THE C. W. ARCHER SHOE COMPANY, Cincinnati, Ohio.

AMERICAN SCROLL SAW



It's Easy to Build Things When You Use This Saw

You will like its sturdy, mechanically correct construction; the ease of operation; the smooth, absolutely square cut. Cuts fibre, bakelite, wood up to 1" and metal up to ¼" thick. A real tool to make your radio sets, scooters, cabinets, experimental work and lots of useful things around the house, etc. Can be motor-driven.

IT'S A REGULAR TOOL
And the Price Is Right

For details write to Dept. A-115

Delta Specialty Co. 858 Third Street MILWAUKEE, WIS.

The New 21 Jewel Burlington Bull Dog

for Rough Service

HERE is the ideal watch for rough service. A masterpiece—with 21 ruby and sapphire jewels—handsome, sturdy, 100% dust proof—and it comes in a heavy 14 karat Gold Strata case. Adjusted to the Second—to Temperature—to Isochronism—to Positions. Built for absolute accuracy under all conditions and so strong in every part that it practically removes all chances of breakage. Note the tight fitting extra cap placed over the movement making it **doubly** dust proof! No matter what your work is—whether firing on a locomotive, working in a mine, on a farm or in a lumber camp, this is the watch for YOU—and you will be astonished to find such a wonderful watch so low priced!

Rock Bottom Price

Easy Payments — Sent on Approval

This masterpiece among watches is sold direct to you, at our rock bottom price, on easy monthly payments. And it is **sent on approval.** No obligation to buy unless you are perfectly satisfied. When you can so easily secure a watch that you can absolutely **depend** upon under all conditions, why deprive yourself of this great satisfaction one day longer than necessary?

Mail the coupon below for our free book and liberal offer! Do it NOW! It costs you nothing to FIND OUT!

Beautiful Burlington Book

"An Education in Watches"

Sent Free!

Don't choose ANY watch until you have seen this beautiful book. It contains in colors the most complete and varied assortment of watch styles and exquisite designs ever shown under one cover! In addition to the "Burlington Bulldog" you will find the new Burlington Supreme, in many beautiful shapes and in white and green gold; the new 18 karat gold Lady Burlington—the new square strap watches for men—special watches for doctors, nurses, etc., in fact, a watch for **everyone!**

You will also learn from the Burlington Book just how to judge the real value of a watch and how to avoid purchasing watches that are over priced. You owe it to yourself to FIND OUT! Remember—the book is free. Just fill out the coupon and mail it TODAY!

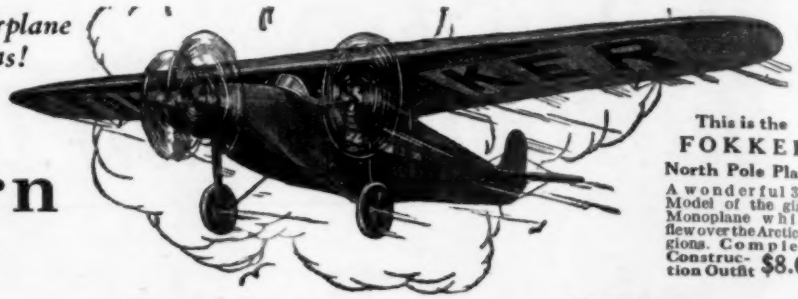
BURLINGTON WATCH COMPANY,
Dept. 13-59 19th St. & Marshall Blvd., Chicago
Canadian Address: 62 Albert Street, Winnipeg, Manitoba

Please send me [without obligation and prepaid] your free book on watches and full explanation of your liberal approval offer on the Burlington Watch.

Name.....

Address.....

Get a Model Airplane for Christmas!



This is the **FOKKER** North Pole Plane

A wonderful 3 ft. Model of the giant Monoplane which flew over the Arctic regions. Complete Construction Outfit **$8.00**

Learn How Airplanes Fly!

BUILDING and Flying a Model Airplane is the most interesting thing you ever did; shows you all the parts of real 'planes, how they are constructed and covered, what each part does, what makes them fly, how they "take off" and land, and many other things real aviators must know.

Build and Fly an Ideal Model Airplane

Ideal Models are true copies of real machines, the ones you see and read about every day. They are designed in exact proportion and have the same constructional features. Anybody can build one. Ideal Model Airplane Construction Outfits show how and contain everything required to build the complete Model, including Plans, Drawings, Diagrams, Building-Flying Instructions and all parts and materials.

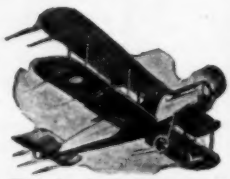
The Models are wonderful; equipped with rubber-tire disc wheels, hand-carved wooden propeller, aluminum radiator and engine cowling, ball-bearing propeller shaft and other parts—even the insignia marking of the real machines are included. Every Model is

Guaranteed to Fly in the Air

when correctly constructed. There are several perfect Models to choose from. Read the specifications for each and pick the one you are going to build.

Plans for Model Airplanes

Complete 3 ft., Scale Drawings with Building-Flying Instructions for Fokker, DeHavilland, JN4D-2, NC-4, Bleriot, Taube, Nieuport or Cecil Peoli Racer, sent postpaid for..... **25c** each
(All 8 for $1.50)



This is the DeHavilland World Flyer

An exact duplicate, 1/14 actual size, of the famous plane which flew around the world. **Complete Construction Outfit.....$7.50**

This is the JN4D2 Curtiss Training Plane

A perfect Model, 1/12 actual size, of the airplane used for training Aviators and the one most frequently seen in the air. **Complete Construction Outfit..... $7.00**
Special Complete Construction Outfit for Building a 6 ft. Model "JN" Plane..... **$25.00**
(By Express Only—Charges Collect)

NC-4 Naval Seaplane: A beautiful 4½ ft. Model of the famous Navy Plane which flew across the Atlantic Ocean. **Complete Construction Outfit..... $10.00**

Nieuport Monoplane: 3 ft. Model of this French Scouting Plane. **Complete Construction Outfit..... $6.00**

Bleriot or Taube Monoplanes: Perfect 3 ft. Models of either of these graceful flyers; both easy to build. **Complete Construction Outfit.....Each $5.00**

Cecil Peoli Racing Airplane: Not a Model, but a record-making racer that will fly more than 2,000 feet. **Complete Construction Outfit..... $4.50**

Ideal 3 ft. Racer: Another racing airplane that will go more than 600 feet. Ready for flight in 15 minutes. **Complete Construction Outfit.. $3.00**

Every Boy's IDEAL **Airplane**

Beautiful, strong Monoplane, 3½ ft. size; easy to build; guaranteed to fly. Complete Outfit ready to assemble **$6.00**

IDEAL Model Airplanes and Racing Airplanes are sold in Toy, Sporting Goods, and Department Stores. Ask for them by name. If not obtainable, we will fill all orders direct upon receipt of price. West of Denver, Colo., and in Canada, add 50 cents to each price above.

AIRPLANE CATALOG

Tells about all Ideal Model Airplanes and Racing Airplanes; also lists hundreds of Parts, Supplies and Materials for Model Builders. 48 pages, most complete catalog published. Get a copy now..... **5c**

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New Patent Fibre Broom: Sweeps, Dusts, Mops. Big Demand, Quick Sales, Good Profits. Send for Free Sample Offer and Selling Instructions.
NATIONAL FIBRE BROOM CO., Dept. P. M., ST. LOUIS, MO.

Handy Tools for Handy Men!

Men everywhere find it easy to build things of wood with Boice-Crane Machines. New 64-page illustrated booklet explaining how to perform many wood-working operations sent postpaid upon receipt of 10c. Also shows complete line of Boice-Crane Circular Saws, Jig Saws, Band Saws, Mortisers, Jointers, Lathes, Drills and explains our money-back guarantee.

14" Band Saw

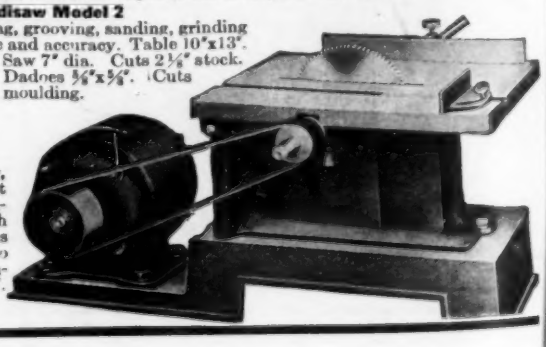
Table 12"x14" tilts 45 degrees. Saws 7" stock. Uses blades 1/16" to ½" wide. Bronze bearings

8" Bench Lathe

Does turning, drilling, sawing, sanding, grinding and jig sawing in wood or soft metal. Swings 8". Capacity between centers 19". Metal-working model fitted with compound slide rest. All Boice machines driven by ¼ to ½ h. p. motor attached to light socket. Machines sold with or without motor. Send 10c for Booklet NOW.

Handisaw Model 2

Does ripping, mitering, grooving, sanding, grinding and drilling with ease and accuracy. Table 10"x13". Saw 7" dia. Cuts 2¼" stock. Dadoes ⅝"x⅝". Cuts moulding.



W. B. & J. E. Boice
Dept. P. M., 12-B, Toledo, Ohio

SPECIAL HOLIDAY OFFER

$24.95

Wonderful Five Tube Set

Quick Delivery Direct From Factory to Your Home

The Radio Set You Want at the Price You Want to Pay

A 5-Tube Set Superior to Most 6 and 7-Tube Sets in Tone Quality, Volume and Distance Getting

Take advantage of this unusual opportunity and special Holiday Offer

Nowhere will you find a value to compare with this remarkable new 1927 design 5-tube radio set. DIRECT FROM FACTORY to you at a tremendous saving. Embodies the newest forward steps in radio, such as U. S. Standard low loss coils, straight line frequency condensers, handy Vernier dials with etched metal plates. Gives you the best radio reception at low cost. A set you can buy complete cheaper than you can build. Direct from our own factory. The Barawik Company is one of the oldest radio specialty institutions in America, numbering 200,000 customers. Every item sold is of high standard. Buy from radio experts and save money. A remarkable 5-tube radio set—finer, better built and producing superior results. It is both rich and attractive looking, and for easy tuning, clear, sweet, natural tones, and distant reception, it is everything you will expect. Takes all tubes including the new power tubes.

Perfect Reproduction It stands alone in tone quality, as comparison with any set at any price will reveal. Is the choice of expert musicians who recognize finest distinctions of harmony and tone. Its beautiful, natural, well-rounded tones reproduce the human voice, whether in song or speech, as clear as a bell. Musical programs are reproduced in sweet, perfect tones, delightfully and harmoniously.

Artistic Cabinet Exceptionally fine hand-rubbed walnut finish cabinet. An ornament to any room. A truly distinctive, dignified cabinet in keeping with other Barawik qualities.

The Greatest Value Today—Look at These Prices! Quality considered our prices are lowest. Nowhere is there value to equal these prices. **$24.95**

101YY5000—Set only, no accessories.....

Complete with All Accessories For Storage Battery Operation Including: 5 201A type tubes, 2 45-Volt "B" Batteries, 1 Fine Loud Speaker, 1 6-Volt Storage Battery, 1 Complete Antenna Equipment, 1 "C" Battery, 1 Fine Head Set. Complete. **$56.95**

301YY5001—Shipping weight, 120 lbs.....

301YY5002—For Dry Cell Operation Including: 5 199 type Tubes, 2 45-Volt "B" Batteries, 1 Fine Loud Speaker, 3 Dry Cell "A" Batteries, 1 "C" Battery, 1 Fine Head Set, Complete. Shipping Wt. 45 lbs. **$51.50**

Mail your order today direct from this ad and get your set before the holidays. Anyone can set up this outfit in an hour or so. Transportation charges extra.

For Sets Up to 10 Tubes

Genuine Raytheon "B" Eliminator Delivers Up to 180 Volts, 50 Milliamp Capacity at 150 Volts.

One of the leading "B" eliminators, of highest quality materials from expensive finish of real green Duco on case to genuine Raytheon tube. Filtering system of 1000 volt high-test condensers and extra capacity choke coils completely remove all hum out of the alternating current. Connect to your light socket, 110-volt, 60-cycle, A. C. current; uses few cents of current a week; pays for itself in replacing "B" batteries. Reception is clear, long distance easy to get due to constant output. Furnished completely assembled, ready to use, and fully guaranteed. Send your check or money order today. C. O. D. orders accepted with 25% deposit.

103YY575 **$26.95**

Postage 30c extra.

FREE RADIO GUIDE

GET YOUR FREE COPY TODAY—NOW!

Mail your order for the **Barawik Special** 5-tube set and eliminator today and insure delivery to your home before the holidays. Also mail the coupon or write us a letter or postcard and we will immediately mail you free the new 1927 Barawik Radio Guide, with its 164 pages of everything interesting for the Radio fan. This will give you plenty of time to do your holiday shopping and get back your orders in time. Never in the history of radio has such a tremendous collection of radio and electrical supplies been presented to the public. Build the set of your dreams now. Get the set or parts and accessories you have always longed for. You can do it, for our low prices will make the most expensive articles reasonable in price. **A New Feature**—A new special Amateur section under the direction of F. J. MARCO, 9ZA. Ask about it.

Mail Coupon Now. Get this Guide into your hands before you buy another part. It will mean money in your pocket. **Write today;** also please send names of other radio fans.

The Barawik Co.

540-551B Monroe St., Chicago, Ill.

MAIL TODAY

BARAWIK CO., 540-551B Monroe Street, Chicago.
Send me my copy of your new 164-page Radio Catalog and Builder's Guide for 1927—FREE.

Name .....

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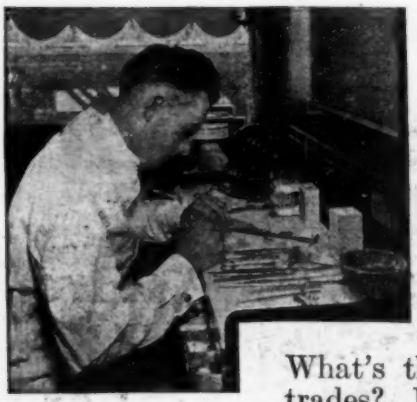
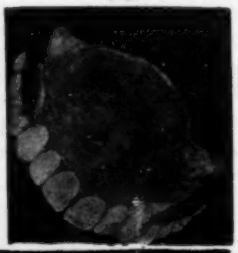


This Dental Laboratory Expert earns $20 a day!

What's the use of training for the old, overcrowded trades? If you're going to prepare for big-salaried jobs or a profitable business of your own GET INTO THE FASTEST GROWING PROFESSION—*"Laboratory Dentistry."* Biggest opportunity for success of the century, because there are ten times as many jobs as men to fill them, because there are a dozen cities crying for Laboratories for each EXPERT capable of operating one!

Easiest, pleasantest work you ever saw! Your own boss, money and success yours from the very beginning. You can start with a "shoe-string." We prepare you in a few months to run a business of your own, to do any job. Common schooling, ability to use your fingers ALL YOU NEED! Free R. R. Fare to Chicago, Cleveland, Detroit, Boston or Philadelphia for a limited time!



Jobs Up to $125 a Week!

In a business where there are many times as many jobs as Experts, salaries are high, hours are easy, opportunities are everywhere! Dentists recognize the high-standing of our graduates. No books here—learn with tools and instruments. Start quick—get ready in a few months for your big opportunity! *Mail Coupon today!*

FREE! R. R. Fare TO Chicago Cleveland Detroit Boston or Phila.

64,000 DENTISTS NEED LABORATORY WORK!

Only a few hundred Laboratories in all the U. S.—most of them in the larger cities. Dentists can't afford to do their own mechanical jobs. They can buy the services of a Laboratory Expert at about $3.00 an hour and sell their own time at $6 to $15 an hour. Dentists will encourage you to learn mechanical Dentistry, start a "Lab" of your own, give them quicker service than sending their work to other cities. Dentists can't wait and keep their patients waiting.

WE HELP YOU OPEN A LABORATORY OF YOUR OWN!

Many of my graduates open a Laboratory of their own. To encourage more men to go into this wonderful Mechanical profession, we will help you find a good location for your Laboratory, and help you make a success of it. Write for complete information on how you can find yourself in a profitable business of your own after you become a Dental Laboratory Expert.

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Right this minute there are openings for 150 Dental Laboratory Experts in locations where they can do a business of $5,000 to $20,000 a year. But you can't *cash in*, take advantage of these OPPORTUNITIES until you're *Trained*. Catalog tells you how quickly and easily you can *get ready*, how hundreds of others have SUCCEEDED! Tells you how you learn in a few months BY DOING ACTUAL LABORATORY JOBS in the world's greatest *Dental Laboratory Schools*. Brings you FREE R. R. Fare offer and other big inducements. *Write for free Book today!*

McCarrie School of Mechanical Dentistry
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EARN while you LEARN! Day students make all or part cost of course by part-time night work. Night students can find plenty of good jobs "to see them thru." **We'll help you!**

Rubber Plates

Learn to make partial upper or lower plates with soldered, cast or wire clasps, with palatal bars; with lingual bars. McCarrie-trained Students learn to make full rubber plates of every type, including Vulcanite base-plates, butted gums, carved gums, etc.

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Here's only a small part of your practical training in Crown-work: Two-piece, seamless, open-face, Richmond, cast-base porcelain, Carmichael, split-pin, carved (swaged) cusp, cast cusp, etc.

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Complete training in both fixed and removable bridgework. Interchangeable teeth, gold dummy, Sanitary porcelain dummy jobs—Roach, Gilmore, Bischoff and all forms of cast-clasp work is taught—not with books but in *actual Laboratory*.

METAL BASE DENTURES

Cast bases of Aluminum, Watt's metal, etc., are included in your training. Both centrifugal and air pressure casting machines are used. Free Book contains complete list of subjects in course.

McCarrie School of Mechanical Dentistry
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Without obligation, please send me your *Free R. R. fare offer* and free Book with complete information about how I may become a Mechanical Dentist. How you will help me open a Laboratory, how you will help me find a job while I take my training, etc.

Name.....

St. No. or R. F. D.....

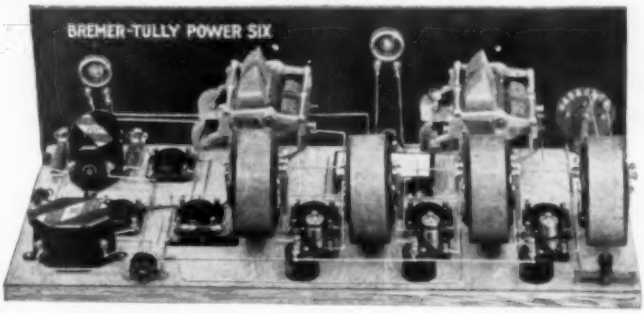
City.....State.....

Do You Want the Best in Radio?

—*then will you read this, please?*

**IT'S ONLY NATURAL TO WANT THE BEST—
BUT USUALLY IT'S A PROBLEM TO FIND IT**

In the past you had to take a chance—but the new **Counterphase Power-Six** has history behind it—and the reputation of a firm who have never put out a product that was not a continued outstanding success.



THE ESSENTIAL PARTS FOR THE COUNTERPHASE POWER-SIX ARE AVAILABLE IN KIT FORM

The **Power-Six** is the B-T patented Counterphase Circuit improved, simplified and up-to-the-minute with the latest developments.

It's more efficient, easier to build, easier to operate and giving the finest reception known to radio.

This is our latest improved model of the Counterphase-Six, as described on pages 303-4-5 of the February, 1926 issue of Popular Mechanics Magazine—sufficient proof of our ability and record as manufacturers of high-grade radio sets and parts.

You ought to know more of this set. Read the coupon below.

The Power-Six "Kit" includes four Torostyle coils, 5 condensers, 3 chokes, 4 resistances, color diagrams and instructions.

These parts purchased individually would cost $45.10—price of kit, $41.50.

(If your dealer cannot supply you, we will ship prepaid on receipt of list price.)

Better Tuning, 10th Edition, gives full information on B-T Sets, Kits, B-Power Units, with discussions and advice that will save money. It's always worth reading.

BREMER-TULLY MFG. CO. 520 SO. CANAL STREET CHICAGO, ILLINOIS

SPECIAL OFFER—Good With This Coupon Only

Before spending money for a B-Eliminator, read *Better Tuning*. It explains many things you should know.

BREMER-TULLY MFG. CO., 520 So. Canal St., CHICAGO, ILL.

We would like to know whether *Popular Mechanics* subscribers read Radio ads. To anyone who sends us this coupon with 10c we will mail a copy of *Better Tuning* and a *diagram in colors* showing complete instructions for building the Power-Six, the regular price of which is 90c.

- ☐ **10c enclosed—send booklet**
- ☐ **Include diagrams**
- ☐ **Send free circulars**
- ☐ **I am interested in a factory-built set only**

.....
(PRINT NAME)

.....
(ADDRESS)

I'll Guarantee To Keep You in Razor Blades for Life!

GOING—Going—Almost Gone!

My sensational offer to send you a *written guarantee* that I will keep you in razor blades for life is about to expire! Promptly on the stroke of midnight, Dec. 31st, it will be withdrawn. And nothing like it will EVER BE OFFERED AGAIN!

KRISS-KROSS—the remarkable invention that makes my extraordinary guarantee possible—marks such an amazing advance in new shaving comfort and economy that it deserves to be called much more than a stropper. KRISS-KROSS is a super-stropper—a blade rejuvenator! Almost literally it makes a new blade out of an old one every day—makes hundreds of keen, quick shaves blossom where only one grew before. Until you've seen KRISS-KROSS—and tested its uncanny ingenuity, you'll never know how really sensational this introductory offer is!

Wonderful Xmas Gift

KRISS-KROSS Stropper and Razor in the neat holly box make an Ideal Xmas gift. Unique and different. Exactly what a man would choose for himself.

365 Shaves a Year From ONE Blade!

KRISS-KROSS employs the diagonal stroke, same as a barber uses. Never before has anyone captured the secret of successfully reproducing this stroke automatically. Eight "lucky leather grooves" do the trick in 11 seconds with a precision it takes a master barber years to attain. But that's not all. KRISS-KROSS embodies still another feature that has hitherto baffled mechanical reproduction. It strops from heavy to light. Adjustable, automatic jig notifies you when your blade is ready with the keenest cutting edge steel can take.

No wonder that this super-stropper prolongs the life of any make blade, single or double edge, for weeks, months and years! Think what it means! No more bother about remembering to buy new blades! No more "raking" with dull ones. KRISS-KROSS coupled with my startling offer below, solves your blade problem for all time. Keep velvet-smooth shaves forever. And think of the economy!

Sensational Offer

And now for my smashing offer! To introduce KRISS-KROSS stropper to those who have not yet seen it, I am giving with it, an astonishing new kind of razor Free! Really 3 razors in o[illegible] Adjustable, surprising and unique! This 3-way razor, wit[illegible] special process blades, completes the outfit which I guarantee[illegible] keep you in razor blades for life! Here's how the plan works. U[illegible] the blades and keep renewing them with KRISS-KROSS supe[illegible] stropper. If one of them goes back on you for any reason ([illegible]cept rusting or nicking) return them and I'll recon[illegible]tion or replace them with new ones. No strings. N[illegible] red tape. I give you amazing guarantee in writi[illegible] It is an ironclad agreement to keep you in razor-bla[illegible] for life!

Send Special "Final Chance" Coupon Today for Free Off[illegible]

Write at once for information on this astonishing [illegible] invention and blade-guarantee offer which was o[illegible]nated some time ago, purely for introductory and [illegible]vertising purposes. Since its inception KRISS-KR[illegible] has leaped to first place as the World's Leading [illegible]chanical Stropper. Now the introductory perio[illegible] past—and with it passes the offer of the blades-[illegible] life guarantee! But there is still an opportunity to secure it[illegible] you act quickly! Get complete details at once. No obligati[illegible] Just clip and mail the coupon today!

AGENTS—$1[illegible]-$400 a Mont[illegible]

Make big money with KRISS-KROSS! Free razor boosts s[illegible] amazingly. N. C. Paige made $104 in 3 days. Emil Ham m[illegible] $50 his very first day. Others average $30 to $66 a day. Ev[illegible] man buys on sight, SPARETIME workers, OFFICE and FA[illegible]TORY men make $6 to $12 extra a day showing KRISS-KRO[illegible] to friends and fellow employees. S. Kantala made $154 ex[illegible] working evenings 3 weeks. Get details at once. Check bott[illegible] of coupon and mail it tonight!

Sold Only Through Authorized Representatives

Rhodes KRISS KROSS STROPPER

RHODES MFG. CO., Inc.
Dept. W 371, 1418 Pendleton Ave., ST. LOUIS, MO.

Rhodes Mfg. Co., Inc.,
1418 Pendleton Ave., Dept. W371, St. Louis, Mo.

Without obligation please send me full details of your special in[illegible]ductory offer to keep me in Razor Blades for LIFE. Also send [illegible] full description of KRISS-KROSS stropper and FREE adjust[illegible] razor.

Name.....

Address.....

City.....State.....

☐ Check this space if you are interested in making money as an authorized KRISS-KROSS representative.

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